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EFFECTS OF PRECIPITATED SILICA AND OF IRON OXIDE ON THE INCIDENCE OF PRIMARY LUNG TUMOURS IN MICE

BY

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Although since the discovery of production of skin cancer experimentally by tar full attention has been given to the importance of the time factor for this type of malignant growth similar care has not been taken when testing various substances for their carcinogenic potency in another organ—namely, the lung. In man the mean age at death from lung cancer is about 55 years—that is, in the last quarter of his average life. In our strain of mice lung tumours are very rare before the tenth month and are not numerous until the last quarter of the animal's average existence. Many experiments have been conducted to test the effects of various dusts upon the lung tissue. Usually guinea-pigs or rabbits have been employed, and the animals have been dusted for a few hundred days and then killed almost immediately after cessation of the dusting. Most of these experiments have given negative results so far as lung tumours are concerned; and it is obvious that such negative results carry little weight if the animals to begin with are not susceptible to lung tumours or if they have not been allowed to live to the age at which these tumours are most common. In my experiments I have used mice which are susceptible to lung tumours, and in practically all cases the animals have been allowed to fulfil their allotted span of life—that is, to live to the age for prevalence of lung cancer.

In industry man is exposed to a dust hazard usually for a quarter or a half of his life, so that in experiment on animals it is necessary to subject them to dust for a similar period of their lives. As mice live only about two to three years they are the most suitable animals to employ. Guinea-pigs and rabbits live so much longer that an experiment properly conducted for the time factor for cancer of the lung is much too prolonged.

In previous researches it was recorded that road dust containing tar greatly increases the incidence of primary lung tumours in mice exposed to clouds of the dust six times a day for five days of the week over a total period of a year (Campbell, 1934). It was also found that removal of the tar from the dust as completely as possible with benzene does not render the dust impotent; it still definitely increases the incidence of the primary lung tumours, but not to so great an extent as when the tar is also present (Campbell, 1937). The composition of the inorganic fraction, which formed 90 per cent. of the total weight, is as follows: SiO_2, 44; CaO, 14; Fe_2O_3, 4.5; MgO, 2.5; Al_2O_3, 12 per cent. As many of the tumours produced by this tar-free dust reveal a malignancy very rarely seen amongst the controls—that is, mice not specially dusted—it is considered that some of the above inorganic constituents such as silica or a soluble silicate might have played some part in their production. In view of the importance of the dust hazard in industry and on the streets, and also in view of the rather confused condition of the "silicosis" problem at the moment, it was decided that all the other constituents should also be tested. Some of these experiments have been concluded—namely, those with silica and with iron oxide—and their results are given below. Some results are also given for a dust containing nickel and obtained from the Mond Nickel Company. Certain of their workers have revealed an increase in lung cancer (Bridge, 1936).

A dust from Czecho-Slovakia has also been tested, and proved to be rather innocuous. As this dust did not contain uranium or arsenic in any quantity it is not regarded as a sample of the dust which is held responsible for the cancer of the lung amongst the Schneeberg and Joachimsthal miners. Professor J. Löwy has kindly given me a sample of the Joachimsthal dust, which is said to contain 55 per cent. of uranium oxide and some 2 per cent. of arsenic. This sample is now being tested. It is usually stated that the Schneeberg and Joachimsthal miners' lung cancer is due to radium, but there appears to be no definite experimental evidence for this. Professor Löwy's experiments (1936) are negative. Döhnert's experiments (1938) with mice exposed to dust in the mines are not convincing. It is unfortunate that such definite statements have been made regarding radium as the cause; these statements are not founded on experimental fact, so far as I know. Of Döhnert's mice only two out of twenty-six had true epithelial lung tumours; there were five others with some evidence of overgrowth or tumour of mediastinal tissue or lymph tissue.

Methods of Investigation

In general the technique described in a previous paper (Campbell, 1934) was followed closely. For each experiment about 150 mice, half of them males and half females, aged about 3 months, were obtained from the Medical Research Council's farm laboratories. This is a mixed strain of mice with a tumour incidence for all organs and for mice of all ages of about 10 per cent., most of the tumours being present in the lungs. Half the mice were used as controls and the other half were exposed to the dust in a respiratory chamber of about 600 litres capacity. The experimental mice were exposed to a moderate cloud of dust inside the chamber once an hour for six hours on five days of each week for a year. The dust came into contact also with the fur and was not rubbed in or dusted off except by the mice themselves. The mice were separated into groups, usually eight or ten, all of the same sex, in boxes with perforated zinc lids (area, 28 cm. by 21 cm.),

the holes in the lid occupying approximately half of the surface. The boxes were provided with a bedding of sawdust and a supply of water. The dust clouds were produced by means of a foot-bellows connected with a bottle containing the dust, and the air also blown in ventilated the chamber sufficiently for one hour, the chamber, with seventy-five mice inside it, being of capacity large enough to prevent, in this period, any undue accumulation of carbon dioxide or undue fall in oxygen percentage. A large fan stirred up the air well and was kept running except for ten minutes every hour, when the cloud of dust was present. The dusted mice were removed every evening from the boxes in which they had been exposed to the dust and were placed in clean boxes with bedding of sawdust and a supply of water and food. The latter consisted of moistened stale brown bread, milk, cod-liver oil, oats, wheat germ, hemp, canary seed, linseed, and sprouted oats.

As before, most of the mice were allowed to fulfil their allotted span of life. A few were killed, and then only if the main result of the experiment was obviously at hand. They were examined carefully for any pathological effects, particularly as regards tumours of the lungs, and histological sections were always prepared from these for microscopical examination.

Results with Silicon Dioxide

Precipitated silica was used for the experiment. It is estimated from special collections of the silica inside the chamber that about 0.5 gramme of silica entered each mouse-box per day, and this includes the heavier particles which fall out of the cloud of dust. Each box was placed in a different position daily in rotation, as there was one position, directly under the opening for entry of the dust, which received much more than 0.5 gramme per day. Each box occupied this position only once in eight days. The particles forming the cloud and apparently inhaled by the mice were examined by microscope, and many appeared to be about 5 μ or less in diameter. As a result of the dusting the main change is nearly a trebling of the incidence of the primary lung tumours—from 7.9 to 21.3 per cent. (Tables I and VII)—in the mice living 10 months or longer. I have excluded mice younger than 10 months as lung tumours are rare among them and as the dust effect requires a longer time factor. Since the mice were about 3 months old at the start of the dusting, ninety days must be added to the durations in the tables to obtain their correct age. There was no obvious fibrosis in the lung tissue, but in the tracheo-bronchial lymph nodes more than 50 per cent. of the mice revealed fibrotic nodules in which the fibrous tissue appears softer than in the fully developed typical nodule in the lung of man in silicosis. In the case of the mice the lungs seem to have got rid of most of the silica dust through cilia action by way of the trachea and also by way of the lymphatics. It is probable that with a heavier dusting the mice might retain more silica in the lung itself, which would then show more fibrosis, but in this case it is also possible that such a degree of fibrosis might inhibit the development of primary lung tumours. Thus Saupe (1939) indicates only slight silicosis in cases of pulmonary tumour among Schneeberg miners, while many other miners with marked silicosis at the same mines escaped cancer of the lung. The presence of the typical fibrotic nodule or tumour may have inhibited the change to further malignancy. It is evident from Table I that the dusting was of such a degree as not to interfere with the rate of growth and general health of the mice. It is also obvious that the increase in incidence of primary lung tumours occurs during the last quarter of the period of existence, and that a higher proportion of the tumours were malignant in the experimental group than in the control group. An interesting point is that, although primary lung tumours are very rare before the mice are 10 months of age, one of the control mice had a malignant adenoma when it died at the age of 175 days. This mouse, however, had at the same time a general condition of lymphadenoma, the lungs and other organs containing large collections of lymphocytes. One of the experimental mice with a malignant tumour of the lung showed an extension or metastasis in the tracheo-bronchial lymph nodes; none of the batch of control mice exhibited such secondary growth.

Half of the dusted mice also revealed overgrowth of the mediastinal connective tissue covering the tracheo-bronchial nodes, whereas only 10 per cent. of the control mice showed such overgrowth. In the dusted mice there was also an increase in incidence of overgrowth or hyperplasia of the tracheo-bronchial lymph nodes, 29.5 per cent. (Table VII) showing such a condition, compared with 14.3 per cent. of the controls (Control I, Table VII). There was also some increase in the number of dusted mice showing overgrowth of lymph tissue in the lung itself. Each dusting experiment is controlled by half of the available mice of the same batch and strain; thus Control I is the control for the mice dusted with silica.

Results with Iron Oxide

In my experiments the precipitated brown oxide of iron (Fe_2O_3, H_2O), British Drug Houses, was employed, and the mice were exposed to about the same quantity each day as for silica—that is, each box of eight or ten mice received usually 0.5 gramme of iron oxide. From Tables II and VII it will be seen that 32.7 per cent. of the dusted mice older than 10 months possessed tumours of the lung, compared with 9.6 per cent. of the control batch (Control IV). Further, nearly all these tumours were malignant in the dusted mice, and in two cases there were extensions or metastases in the tracheo-bronchial lymph nodes, while there were no metastases in the control group. One of the dusted mice had a fibrosarcoma of the skin of the back of the neck resembling that described by Ahlström and Andrewes (1938) for the rabbit. The cell inclusion-substance seen in the case of the mouse did not appear to

TABLE I.—*Mice Exposed to SiO_2*

Number of Days of Experiment	Number of Mice Alive		Weight (gm.) of Living Mice		Animals with Lung Tumours					
					Control			SiO_2		
	Control	SiO_2	Control	SiO_2	Total	Simple	Malignant	Total	Simple	Malignant
0	75	74	18.2	18.2	0	0	0	0	0	0
100	67	66	27.3	27.5	1	0	1	0	0	0
200	63	61	30.1	30.8	1	0	1	0	0	0
300	57	55	31.0	32.0	1	0	1	0	0	0
400	36	39	31.0	32.0	1	0	1	1	1	0
500	29	24	30.9	32.6	2	1	1	3	1	2
600	17	12	32.3	31.8	3	2	1	5	2	3
700	7	6	31.0	32.0	5	3	2	9	4	5
800	4	3	25.7	29.0	5	3	2	11	5	6
900	0	1	—	31.0	5	3	2	12	5	7
917	—	0	—	—	5	3	2	13	5	8

TABLE II.—*Mice Exposed to Iron Oxide and to $Fe_2O_3 + SiO_2$*

Number of Days of Experiment	Number of Mice Alive			Weight (gm.) of Living Mice			Animals with Lung Tumours								
							Control			Fe_2O_3			$Fe_2O_3+SiO_2$		
	Control	Fe_2O_3	$Fe_2O_3+SiO_2$	Control	Fe_2O_3	$Fe_2O_3+SiO_2$	Total	Simple	Malignant	Total	Simple	Malignant	Total	Simple	Malignant
0	73	75	74	17.6	17.0	17.3	0	0	0	0	0	0	0	0	0
100	59	62	65	22.1	24.2	25.5	0	0	0	0	0	0	0	0	0
200	52	52	62	26.1	29.7	30.2	0	0	0	0	0	0	0	0	0
300	39	48	49	31.0	30.5	30.2	0	0	0	0	0	0	0	0	0
400	36	35	42	31.6	30.8	31.3	0	0	0	2	1	1	0	0	0
500	21	31	33	30.6	30.3	31.4	0	0	0	2	1	1	1	1	0
600	13	19	18	31.1	30.1	31.5	1	1	0	4	1	3	7	4	3
700	9	10	9	30.8	29.0	33.3	4	3	1	13	2	11	10	5	5
730	7 (K)	8	8 (K)	28.7	29.0	30.3	5	3	2	14	2	12	12	5	7
800	—	8	—	—	28.8	—	—	—	—	14	2	12	—	—	—
832	—	4 (K)	—	—	29.8	—	—	—	—	17	3	14	—	—	—

K = Killed.

stain quite so deeply as that observed in the rabbit. The lungs of this mouse exhibited both a primary malignant adenoma and extensive masses of the fibrosarcoma. It is possible that the iron oxide was a factor in the production of the fibrosarcoma both in the skin and in the lungs, but of course the fibrosarcoma in the skin may have been the primary tumour and the masses in the lung may have been metastases. There may have been some injury of the skin, permitting the entrance of some of the iron oxide. Parsons (1938a, 1938b) and Warren (1939a, 1939b) have observed that mice undergoing treatment with a carcinogenic agent show signs of blood destruction, and Warren has observed a significant increase of iron in the lymph glands. Whether this is associated with carcinogenesis cannot yet be affirmed with certainty, but similar increase in iron content of the glands has been observed in mice bearing spontaneous mammary tumours.

The mice dusted with iron oxide revealed a marked increase in the incidence of hyperplasia of the tracheo-bronchial lymph nodes, 50 per cent. of them showing such a condition, compared with 13.4 per cent. of the controls (Control IV, Table VII). The dusted group also revealed a marked increase in the incidence of hypertrophy of lymph tissue in the lungs themselves, 32.7 per cent. showing such a condition, compared with 11.5 per cent. for the controls. In some cases the lymphocytes appeared to change into a malignant type of cell, spreading and infiltrating the lung tissue of the dusted mice. There was no marked difference in the condition of the lymph tissue in other parts of the body—that is, in the "general" lymph tissue. The increase of lymphocytic tissue in the lungs and tracheo-bronchial lymph glands is apparently due to the iron oxide, but apart from this hypertrophy there was no other reaction due to the dust—that is, there was no fibrotic change in the lymph nodes, but there was an increase in fibrous tissue surrounding these nodes in one-third of the dusted mice, although only 10 per cent. of the controls showed this condition.

Turner and Grace (1938) suggested that iron might be concerned with cancer of the pancreas in man. I could find no evidence for this in the mice.

Results with Silicon Dioxide plus Iron Oxide

Precipitated silica and brown oxide of iron were well mixed together in equal quantities and the mice were dusted with the mixture. In this experiment each box of mice received about half the amount of silica and of iron oxide as in the above experiments, but together the total amount of dust was the same. The tracheo-bronchial nodes did not show any definite fibrotic nodules, so that probably the amount of silica reaching them was not sufficient to produce these nodules, although in 6 per cent. of the mice there was some increase in scattered fibrous tissue in the nodes. In about a third of the dusted mice (33 per cent.) there was an increase in the fibrous tissue surrounding these lymph nodes, whereas in only about 10 per cent. of the controls was there such an increase. There was no indication of fibrosis in the lung tissue, but the incidence of primary lung tumours (Tables II and VII) in mice living longer than 10 months was 19.3 per cent., compared with 9.6 per cent. for the controls (Control IV, Table VII). Also there were 35.5 per cent. of the dusted mice with hypertrophy of the tracheo-bronchial lymph nodes, compared with 13.4 per cent. of the controls; and an increase of lymph tissue in the lung itself was observed in 30.6 per cent. of the dusted mice, compared with 11.5 per cent. of the controls. One of the dusted mice showed a tumour of the lung with some cells with inclusion bodies somewhat resembling those of the fibrosarcoma mentioned in the case of the iron oxide; this tumour gave origin to an extension or metastasis into the tracheo-bronchial lymph nodes.

Results from "Nickel" Dust

The sample of concentrated matte was obtained from the medical officer of the Mond Nickel Company. Its approximate composition as given by their chief chemist is recorded in Table III. In my first experiment with this dust it was too concentrated, with the result that the mice

TABLE III.—"*Nickel*" *Dust: Approximate Composition of the Concentrated Matte*

	%		%
Nickel and cobalt	40.5	Palladium	0.2
Copper	22.5	Gold	0.05
Iron	5.0	Sulphur	10.0
Lead	3.7	Silica (combined)	0.7
Arsenic	10.8	Iridium, Rhodium, Ruthenium	0.04
Silver	1.3		
Platinum	0.2		

Balance, oxygen as oxides.

died of arsenic poisoning. In my second experiment 4 c.cm. of the dust was diluted with 160 c.cm. of a sample of road dust from which the tar had been extracted by benzene. The incidence of primary lung tumours among mice living 10 months or longer was 29.8 per cent. for the mice dusted with this diluted "nickel" dust (Tables IV and VII) and 12.5 per cent. for the undusted control batch (Control III, Table VII). The diluted "nickel" dust had a somewhat adverse effect in the earlier stages of the experiment, twenty-nine dusted mice dying in the first 200 days of the dusting, compared with only eleven deaths amongst the controls. This may have been due to some undetected epidemic, but was probably connected with the arsenic in the "nickel" dust. The increase in lung tumours is significant; but the full effect of this "nickel" dust upon the lung has probably not yet been obtained, and a further experiment is contemplated with the same matte somewhat less diluted. Further, the dust used for diluting the "nickel" dust causes an increase of lung tumours in itself, so that if the "nickel" dust is very active it should increase the incidence to a greater extent

the holes in the lid occupying approximately half of the surface. The boxes were provided with a bedding of sawdust and a supply of water. The dust clouds were produced by means of a foot-bellows connected with a bottle containing the dust, and the air also blown in ventilated the chamber sufficiently for one hour, the chamber, with seventy-five mice inside it, being of capacity large enough to prevent, in this period, any undue accumulation of carbon dioxide or undue fall in oxygen percentage. A large fan stirred up the air well and was kept running except for ten minutes every hour, when the cloud of dust was present. The dusted mice were removed every evening from the boxes in which they had been exposed to the dust and were placed in clean boxes with bedding of sawdust and a supply of water and food. The latter consisted of moistened stale brown bread, milk, cod-liver oil, oats, wheat germ, hemp, canary seed, linseed, and sprouted oats.

As before, most of the mice were allowed to fulfil their allotted span of life. A few were killed, and then only if the main result of the experiment was obviously at hand. They were examined carefully for any pathological effects, particularly as regards tumours of the lungs, and histological sections were always prepared from these for microscopical examination.

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500	21	31	33	30.6	30.3	31.4	0	0	0	2	1	1	1	1	0
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Lead	3.7	Silica (combined)	0.7
Arsenic	10.8	Iridium, Rhodium, Ruthenium	0.04
Silver	1.3		
Platinum	0.2		

Balance, oxygen as oxides.

died of arsenic poisoning. In my second experiment 4 c.cm. of the dust was diluted with 160 c.cm. of a sample of road dust from which the tar had been extracted by benzene. The incidence of primary lung tumours among mice living 10 months or longer was 29.8 per cent. for the mice dusted with this diluted "nickel" dust (Tables IV and VII) and 12.5 per cent. for the undusted control batch (Control III, Table VII). The diluted "nickel" dust had a somewhat adverse effect in the earlier stages of the experiment, twenty-nine dusted mice dying in the first 200 days of the dusting, compared with only eleven deaths amongst the controls. This may have been due to some undetected epidemic, but was probably connected with the arsenic in the "nickel" dust. The increase in lung tumours is significant; but the full effect of this "nickel" dust upon the lung has probably not yet been obtained, and a further experiment is contemplated with the same matte somewhat less diluted. Further, the dust used for diluting the "nickel" dust causes an increase of lung tumours in itself, so that if the "nickel" dust is very active it should increase the incidence to a greater extent

TABLE IV.—*Mice Exposed to Diluted "Nickel" Dust*

Number of Days of Experiment	Number of Mice Alive		Weight (gm.) of Living Mice		Animals with Lung Tumours					
					Control			"Nickel"		
	Control	"Nickel"	Control	"Nickel"	Total	Simple	Malignant	Total	Simple	Malignant
0	75	76	16.3	15.8	0	0	0	0	0	0
100	72	58	24.2	24.1	0	0	0	0	0	0
200	64	47	28.0	28.0	0	0	0	0	0	0
300	59	42	30.8	29.7	0	0	0	0	0	0
400	51	40	31.9	31.9	0	0	0	0	0	0
500	47	33	32.9	33.6	0	0	0	0	0	0
600	36	23	30.9	34.0	2	1	1	5	1	4
700	19	12	30.0	32.2	3	1	2	6	1	5
790	6 (K)	0	28.5	—	8	3	5	14	2	12

K = Killed.

than that obtained. The difficulty, of course, is to use a dilution which is strong enough to permit the full effect without poisoning the mice with the arsenic.

The dusted mice also revealed an increase in incidence of hypertrophy of lymph tissue both in the tracheo-bronchial nodes and in the lung tissue itself, the percentages being respectively 46.8 and 25.5 for the dusted mice and 10.9 and 7.8 for the controls (Control III, Table VII). Also in 36 per cent. of the dusted mice there was an increase in the mediastinal connective tissue surrounding the tracheo-bronchial nodes, compared with 5 per cent. for the controls. There was no evidence of fibrosis in the lung itself or in the tracheo-bronchial lymph nodes.

Results from Czecho-Slovak Dust

This sample of dust is apparently not the "active" dust responsible for the lung cancer amongst the Joachimsthal miners, although it was stated to have been collected in the vicinity of the mines. The composition of the dust as found by the Government Chemist, London, is shown in Table V. This dust contains much silica, probably as silicate, but no arsenic and only small quantities of uranium and radium. The results of the dusting experiment are given in Tables VI and VII. The mice used

TABLE V.—*Composition of a Czecho-Slovak Dust*

	%		%
Silica	56.97	Sodium oxide	1.02
*Alumina	13.72	Sulphuric anhydride	3.29
Iron oxide	6.48	Copper, silver, lead, and tin oxides	0.33
Titanium oxide	0.71	Manganese, zinc, and nickel oxides	0.10
Calcium oxide	3.70	Loss on ignition (H_2O and CO_2)	8.62
Magnesium oxide	2.43		
Potassium oxide	3.07		

* Includes any uranium oxide which does not exceed 0.04 per cent. No arsenic was detected in the sample. Radium content approximately 0.1 mg. per ton.

were apparently very resistant to development of lung tumours, since only one mouse, or 1.6 per cent., of the control batch of sixty mice living 10 months or longer possessed a tumour (Control II, Table VII). Among the sixty-one dusted mice there were seven, or 11.4 per cent., with lung tumours—a definite increase over this particular batch of controls, but not a significant increase when compared with the 11.3 per cent. average for a large number of controls. The dust appeared to be very fine, and the lungs of the dusted mice did not show much dust present, most of it being removed by way of the trachea or by the lymphatics. In 30 per cent. of the dusted mice there was some increase in the mediastinal connective tissue, compared with 5 per cent. for the controls. There was no increase in lymph tissue in the lungs themselves, but in 19.7 per cent. of the dusted mice there was some hypertrophy of the tracheo-bronchial lymph nodes, compared with 8.3 per cent. for the controls. One of the lung tumours of the dusted mice gave rise to an extension or metastasis into these nodes, but there was no extension in the case of the tumour in the control mouse.

Discussion

It is probable from Tables I, II, and IV that the experiments would have been negative if the animals had been killed much before the 600th day after starting the dusting. In the silica experiment the final ratio for the incidence of lung tumours in the dusted mice to that for the controls is three to one—a definite increase. There has been much controversy regarding the part played by silica in the development of lung cancer in man. Many observers can find no evidence that silica plays any part (Vorwald and Karr, 1938; Koletsky, 1938; Gardiner, 1940), but others find some such influence (Allen, 1934; Pancoast and Pendergrass, 1933). Anderson and Dibble (1938) conclude that a group of cases of pulmonary carcinoma exists in which the lungs contain an excess of silica and show histological evidence of silicotic fibrosis; they hold that the role of silicosis is aetiological, as does Charr (1937). As stated above, there is evidence that the full development of the silicotic nodule is inhibitory to development of malignancy and that slight fibrosis is not. Silica and iron are present in the atmosphere in the vicinity of metal-grinders, who show a relatively high incidence of carcinoma of the lung (Kennaway and Kennaway, 1936). Turner and Grace (1938) also draw

TABLE VI.—*Mice Exposed to Czecho-Slovak Dust*

Number of Days of Experiment	Number of Mice Alive		Weight (gm.) of Living Mice		Animals with Lung Tumours					
					Control			Dusted		
	Control	Dusted	Control	Dusted	Total	Simple	Malignant	Total	Simple	Malignant
0	74	74	16.8	17.2	0	0	0	0	0	0
100	68	70	24.1	24.7	0	0	0	0	0	0
200	60	61	26.2	25.7	0	0	0	0	0	0
300	43	51	24.9	28.2	0	0	0	0	0	0
400	37	37	26.8	27.0	0	0	0	0	0	0
500	19	25	28.4	27.5	0	0	0	1	0	1
600	14	14	25.8	28.0	1	0	1	3	2	1
700	4	5	27.3	29.0	1	0	1	5	2	3
800	1	1	29.0	27.0	1	0	1	6	2	4
813	1 (K)	0	27.0	—	1	0	1	7	2	5

K = Killed.

TABLE VII.—*Synopsis of Pathological Data*

Group of Mice	No. of Mice living 10 Months or Longer	Mice with Pulmonary Tumours	Mice with Mammary Tumours	Mice with Increase of Lymph Tissue			Mice with Broncho-pneumonia	Mice with Inclusion Bodies: Liver
				Bronchial Nodes	Lungs	"General"		
Control I	63	5 (7.9%)	3	9 (14.3%)	2 (3.2%)	2 (3.2%)	10 (15.9%)	0
Control II	60	1 (1.6%)	0	5 (8.3%)	7 (11.6%)	2 (3.3%)	6 (10.0%)	0
Control III	64	8 (12.5%)	2	7 (10.9%)	5 (7.8%)	3 (4.7%)	6 (9.4%)	3
Control IV	52	5 (9.6%)	1	7 (13.4%)	6 (11.5%)	4 (7.7%)	2 (3.8%)	0
Totals	239	19 (7.9%)	6	28 (11.7%)	20 (8.3%)	11 (4.6%)	24 (10.0%)	3
SiO_2	61	13 (21.3%)	1	18 (29.5%)	6 (9.8%)	2 (3.3%)	13 (21.3%)	0
C.S. dust	61	7 (11.4%)	1	12 (19.7%)	2 (3.3%)	0 (0.0%)	6 (9.8%)	0
"Nickel"	47	14 (29.8%)	0	22 (46.8%)	12 (25.5%)	5 (10.6%)	11 (23.4%)	2
Fe_2O_3	52	17 (32.7%)	0	26 (50.0%)	17 (32.7%)	5 (9.6%)	11 (21.1%)	1
Fe_2O_3—SiO_2	62	12 (19.3%)	0	22 (35.5%)	19 (30.6%)	3 (4.8%)	18 (29.0%)	1
Totals	283	63 (21.5%)	2	100 (35.3%)	56 (19.8%)	15 (5.3%)	59 (20.8%)	4

attention to the high mortality from cancer of the respiratory tract in engineers, foundry-workers, and grinders. My own experiments with mice have given definite positive evidence, and there is a criticism against previous negative experiments, since the animals were either not sensitive to development of lung cancer or they were not allowed to live to the cancer age.

The iron oxide dust also produced a definite increase in the incidence and malignancy of the lung tumours in mice. In man some cases of lung cancer have been recorded in which iron oxide has been regarded as the causative agent (Dreyfus, 1936). It is probably a factor in the increase in the grinders and others mentioned above.

The combined experiment in which iron oxide was mixed with the silica dust gives confirmation to both the above experiments. Other similar experiments are being conducted with various mixtures of inorganic substances, and it is felt that greater carcinogenic activity may yet be detected. The experiments support the theory of irritation without inflammation (Campbell, 1939a) as a factor in the production of lung cancer. The great increase in the incidence of hypertrophy of the lymph tissue in the lungs and tracheo-bronchial lymph nodes of the dusted mice (Table VII) is further evidence of irritation, as is the increase in the incidence of hypertrophy of mediastinal connective tissue mentioned above. In most mice, both controls and dusted, there is terminal pneumonia, but there is more evidence of thickening or pneumonitis (Maxwell, 1938) in the dusted mice. Further, the incidence of bronchopneumonia among the dusted mice is on an average double that of the control (Table VII).

As regards other tumours, there were six cases of mammary tumours among 239 controls, compared with two cases among the 283 dusted mice. Also there were further cases of mice with the recently discovered inclusion body in the liver cell (Campbell, 1939b): three of the total controls and four of the dusted mice exhibited such a condition.

There has been some controversy regarding the histology of the mouse lung tumour, and at one time these were all called simple non-metastatic tumours. More recently this idea had to be abandoned. In my experiments I have now sixteen cases of primary lung tumours exhibiting extensions or metastases into the tracheo-bronchial lymph nodes or into other organs. In two cases metastases have been observed in the kidney, in one case in the spleen, and in one case in the heart. Certainly some of the mouse lung tumours are simple papillomas or adenomas resembling somewhat the condition known as jaagsiekte in sheep (De Kock, 1929; Dungal, 1938). It is possible that these simple neoplasms in sheep are also due to dust of certain kinds, although Dungal suspects the presence of a virus. Naeslund (1940) found that dusting guinea-pigs with certain dusts tends to cause adenoma-like growths in the lung. Among my own mice I have observed both simple and malignant tumours. In most cases there are mixtures of the two types, while the tumour often seems to originate as a simple tumour near the pleura and to increase in malignancy with irritation or age. There is no doubt as to the malignancy of some of the tumours, the cells resembling those of adenocarcinoma seen in the lung of man, and in some cases there is a tendency to formation of spindle cells which infiltrate rapidly. This increase in malignancy is common among the specially dusted mice but rare among the controls. There have been only two of my control mice with primary malignant lung tumours showing extensions into the tracheo-bronchial nodes, but in both of these primary tumours there was much fibrosis—that is, evidence of some previous irritation in the lung. It must be remembered that in the lungs of the control or not specially dusted mice there is often much dust which has been inhaled from the atmosphere or content of the boxes. This dust may be responsible for the lung tumours in these controls. The highest incidence for lung tumours in the batches of fifty to sixty control mice has been 20 per cent., but in the corresponding batch of specially dusted mice it was 45 per cent. In all, of 593 control mice 11.3 per cent. possessed lung tumours, compared with 31.5 per cent. in 727 experimental or dusted mice. The mechanism of irritation in the cell responsible for the increase in the latter is not known; it may, however, be concerned with cell respiration or oxidation (Campbell, 1940), at any rate so far as iron is concerned.

Summary

Dusting with precipitated silica or with brown oxide of iron trebles the incidence of primary lung tumours in mice living 10 months or longer. There is a definite increase in malignancy with the iron oxide. The amount of silica used did not cause formation of fibrotic nodules in the lung tissue of the mice, and it is suggested that the fully formed fibrotic nodule of silicosis inhibits malignancy. The tracheo-bronchial lymph nodes of the mice exhibited some degree of fibrotic nodule formation due to silica. The dusting also caused an increase in the number of mice showing hypertrophy of the lymph tissue in the lungs and in the tracheo-bronchial lymph nodes. The connective tissue surrounding these nodes was also increased, as was the incidence of bronchopneumonia. The above results with silica and iron give experimental support to the statistical evidence that there is a relatively high incidence of carcinoma of the lung in metal-grinders, engineers, and foundry-workers.

Preliminary experiments with a "nickel" dust have also been concluded.

It is pointed out that previous negative results in animal experiments with silica and other dusts are probably due

to the fact that the animals were not permitted to live to the age for production of lung tumours or the animals employed were not sensitive to the development of lung tumours.

Animal experiment has not yet established the cause of lung cancer in the Schneeberg and Joachimsthal miners.

I am indebted to the Joachimsthal authorities, to Professor J. Löwy, and to the Mond Nickel Company for supplying samples of dust; also to my technical assistant, Mr. C. Pergande, for help in this research, and to Mr. F. J. Higginson for cutting and staining the sections.

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RAPID DEATH IN BILE PERITONITIS

BY

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AND

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Bile peritonitis following operations on the biliary tract is fortunately not a common condition in the experience of most surgeons. It is, however, of some considerable gravity, attended as it is by a mortality of from 30% (Ricketts, 1905) to 50% (Manson and Eginton, 1938). There are, of course, many other causes of bile peritonitis, and it may be of interest to recapitulate the classification given by James (1938): (1) rupture of an infected gall-bladder; (2) traumatic rupture of the biliary passages; (3) spontaneous rupture of a common bile-duct cyst; (4) leakage from unruptured but infected biliary passages, the so-called "biliary dew" of Leriche.

Our purpose here is to present a case of diffuse bile peritonitis following operation on the biliary passages in which the outstanding feature was the rapidity of death.

Case Report

A man aged 51 was admitted to Hammersmith Hospital with a history of having had cholecystectomy performed seven years previously, following which he was perfectly well for eighteen months. He was then suddenly stricken with a stabbing type of pain in the epigastrium which was of such severity that he had to be taken to hospital and kept under observation for four days, during which time he was very nauseated but did not vomit. There was no shivering and no jaundice, but the stools were pale and he suffered from chronic constipation. Thereafter he had many similar attacks, and just prior to admission the dyspepsia which was present before his original operation returned and he was losing some weight. The attacks kept him in bed for two or three days, and between times he had to be very careful with his food, especially avoiding fats, fish, and condiments.

On examination the patient was a healthy-looking man who never smoked or drank alcohol; temperature and pulse were normal. There was a slight icteric tinge to the sclerae. The abdomen showed the old right supra-umbilical paramedian incision. There was an area of tenderness sand rigidity beneath the ninth right costal cartilage. The liver was not enlarged. The examination was otherwise negative. Radiographs did not disclose any evidence of an opaque biliary calculus, and a barium meal revealed no abnormality.

Eight days after admission an exploration of the common bile duct was carried out by G. G. T. The abdomen was opened through the original incision, and by following the scarred area over the gall-bladder fossa the duct was identified without much difficulty. It was somewhat dilated, but not to any great extent, and would not, for instance, admit the tip of the little finger. There was no external evidence of inflammation, nor could calculi be palpated from outside. On incision the escaping bile did not look abnormal and was without odour; unfortunately it was not sent for bacteriological examination. Five small pigment calculi were removed from its lower end by means of the Desjardins forceps, but *in situ* these were stuck together, forming a single conglomerate concretion. No calculi were found in the hepatic ducts. The patency of the lower end of the common duct was established by passing a 9/12 Lister bougie through into the duodenum. With the intention of carrying out cholangiography during convalescence a No. 10 soft rubber catheter, with an additional hole cut in its side, was inserted into the common duct directed towards the duodenum, the incision in the duct being closed round about it by suture. The abdomen was closed in layers without further drainage. From the time the patient recovered from the anaesthetic he had more pain than usual, and twenty-four hours after operation he complained very much of colicky spasms on the right side of the abdomen. There was no vomiting and no distension, and the abdomen was soft on palpation. The pain increased in severity to the point where the patient cried out, and there was no relief from the passage of flatus. Under the influence of morphine he remained comfortable for twelve hours, and then awakened complaining of more severe pain in the upper right quadrant of the abdomen, which was extremely tender but soft. The tongue was moist and there was no vomiting. One ounce of mucus was aspirated from the stomach. The rectum was empty. The wound was dry and there was only a trace of bile from the tube. Nothing abnormal was found in the chest. The pulse rate was 140 and of poor volume, and the respiratory rate 40; the temperature was normal.

The patient rapidly passed into a state of profound shock. Two hours later some rigidity, together with extreme tenderness and dullness, developed in the flanks and intraperitoneal bile leakage was suspected. As a diagnostic procedure an exploratory needle was inserted in the left flank and 75 c.cm. of clear viscid bile removed. The shock was treated by appropriate measures, including blood transfusion. For three hours there was a good response, but while preparations were being completed for an operation to provide drainage the patient died.

It may be useful to recapitulate that the operation was concluded about midday on a Thursday. Except for the unexplained pain the condition was not considered unsatisfactory at midday on Friday. After that time deterioration was rapid, and by midnight the condition was one of profound shock. In spite of an apparent improvement death occurred about eight o'clock on Saturday morning. It was only possible to get permission to open up the abdominal incision, and that not until forty-eight hours after death. There was a low form of plastic peritonitis near the operation area. The pelvis and the left flank contained about a pint each of fluid which was mostly bile; it was slightly brownish rather than yellow, but without offensive odour. The liver was a dirty brown colour, crepitant and friable, and the cut surface looked like a sponge; the appearance suggested infection with a gas-forming organism, and this was confirmed on histological examination. There was no obvious gas in the peritoneum and no sign of gross infection in the wound.

The incision in the common bile duct did not appear to have given way, and the leakage was apparently from a very small space just above the tube. No further examination could be made.

Comment

There is considerable evidence in the literature to indicate that cases of bile peritonitis fall into two groups—those which develop a localized collection of bile shut off from the rest of the peritoneal cavity (Caulfield, 1936; Fifield, 1926), and those in which a diffuse peritonitis ensues (Verrall, 1897; Martin, 1898; Fifield, 1926). It is less easy to find data on the clinical course of post-operative bile leakage. It is apparent that the case we have presented falls into the second category. We have, however, been able to find two cases of post-operative extravasation of bile in which localization occurred. The first was observed by one of us (D. M. D.) while house-surgeon to Mr. C. A. Joll, by whose kind permission the case is quoted.

Cholecystectomy was performed in a woman aged 46 who had complained of attacks of abdominal pain and vomiting for two years. The gall-bladder contained numerous calculi and showed chronic inflammatory change. The patient had an uneventful convalescence except for slight abdominal distension and obstinate constipation. The drainage tube was removed on the tenth post-operative day and the patient was up and in a chair on the eleventh day. On the twelfth day she complained of some abdominal pain. In the evening she collapsed suddenly and was immediately put to bed and died in about fifteen minutes. It was thought likely that the case was one of pulmonary embolism, although no complaint of chest pain had been made. However, post-mortem examination performed by Dr. Charles Bryson did not reveal embolism or thrombosis in the pulmonary vessels. In the right subphrenic space elevating the diaphragm and compressing the lower lobe of the right lung there was a collection of bile which measured about four pints. It was walled off from the general peritoneal cavity by omental adhesions. There was no diffuse peritonitis. There were no other significant findings except for the fact that no bile was present in the duodenum. The course of the extravasated bile could not be determined with certainty because of the adhesions around the bile passages.

The second case followed cholecystostomy and choledochostomy, carried out in the patient's own home by G. G. T. in 1910. The patient was a woman aged 30 who had suffered from attacks of typical biliary colic for a year. The gall-bladder and biliary passages were exposed by a transverse Rutherford Morison incision. Calculi were removed from both the gall-bladder and the common duct and drains inserted. The latter were removed on the fourteenth post-operative day and the wound then healed rapidly. However, she subsequently suffered from vomiting and there was some haemorrhage from the wound. Gradually signs of peritonitis appeared, together with right shoulder-tip pain. When seen some six weeks after the operation the patient was gravely ill. The incision was quite healed, but there was a large fluctuant swelling in the upper abdomen with the characteristics of a collection of fluid in the lesser sac. With a minimum of anaesthetic the anterior end of the incision was opened up and a large quantity of bile at once escaped. After this the patient rapidly improved and drainage ceased in about a fortnight. Thirty years later she was reported to be in good health.

Cause of Death

There appear to be three theories as to the principal factor involved in a fatal outcome, but it is reasonable to suppose that none is mutually exclusive of the others in any given case.

1. The experimental work of Wangensteen (1926) led to the belief that death was due to cholaemia from absorption of bile salts from the extravasated bile.

2. The work of Harkins, Harmon, and Hudson (1936) and of Moon and Morgan (1936) suggests that death is due to shock from loss of circulating blood volume into congested abdominal viscera.

3. Finally, the third theory, supported by the work of Rewbridge (1931) and Mentzer (1934), seems to indicate that death is caused by a bacterial peritonitis in every way comparable to that which develops in an untreated case of perforation of a peptic ulcer.

In the case we have presented there were many features which resembled shock. Thirty-six hours after the operation the extremities were cold, the pulse imperceptible, and the blood pressure low. Nevertheless the patient was quite conscious and was not aware of the gravity of his condition. The picture was therefore one of peripheral circulatory failure. Further, a definite though transitory improvement took place after blood transfusion.

The question arises whether a clinical picture of this kind could have been produced in such a short time by a bacterial peritonitis. It must be admitted that in the terminal stages of bacterial peritonitis a clinical picture somewhat resembling shock appears. Indeed, it has been suggested that the mechanism of death in both conditions is similar—namely, irreversible peripheral vascular failure (Moon, 1938). But that this should have appeared in thirty-six hours and be followed by a fatal outcome four hours later is unlikely. Further, the post-mortem findings were not those of a fulminating bacterial peritonitis.

It is not possible to say what part absorption of bile salts may have played, but in view of the two other cases cited, in which large collections of bile were present, and of similar cases referred to by Caulfield, we can be reasonably sure that the presence of large quantities of bile in the peritoneal cavity is at least not always incompatible with life, however serious it may be eventually.

So far as treatment is concerned there is agreement that immediate drainage is wise. The figures of Fifield (1926) are convincing. In a series of twenty-eight cases of bile peritonitis the mortality in the late cases which had already developed diffuse peritonitis was 66%, while in the early cases it was only 16.6%.

Summary

A case of post-operative bile peritonitis is presented in which the outstanding feature was the rapidity of death.

The various factors involved in the high mortality of the condition are discussed.

We are indebted to Dr. Allen Daley, principal medical officer of the L.C.C., for permission to report the case admitted to Hammersmith Hospital, and to Mr. C. Rapp, then house-surgeon, for the clinical notes.

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P. Pribat (*Thèse de Paris*, 1940, No. 168) states that of the complications caused by beauty cures and cosmetic preparations the most serious are those due to hair dyes and decolouring agents. The largest number of cases of dermatitis are caused by tinctures containing aniline derivatives. The dermatitis is due to individual intolerance, and in every respect resembles the complications of chemotherapy. Prophylaxis consists in the application of a skin test made from twenty-four to forty-eight hours before the use of the tincture. The complications belong to the group of allergic affections whose pathogenesis is still obscure.

LIPOID PNEUMONIA

BY

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For some years it has been recognized that intranasal medication with oily preparations may lead to changes in the lungs. Because of its blandness oil gravitates from the nasopharynx to the larynx, and may enter the lungs without eliciting a cough reflex. In 1925 Laughlen first called attention to a condition which has since been reported from time to time under such names as oil-aspiration pneumonia, lipoid-cell pneumonia, oil pneumonia, and *stéatose pulmonaire*. The changes induced in the lungs by the presence of oil may occur apart from nasal medication. Many of the reported cases have been in infants or small children, and it appears that in weakly infants small quantities of milk foods, cod-liver oil, or laxative doses of paraffin may be aspirated and give rise to the condition. The fact that such substances are often administered to a debilitated child when it is lying on its back increases the chances of aspiration; so also does a mechanical defect of the palate or a nervous disease affecting deglutition.

It has been shown experimentally by Cannon and Walsh (1938) that medicated nasal oils and even plain light mineral oil are definitely toxic to pulmonary tissues, causing the characteristic picture of acute lipoid pneumonia. The alveoli of the lungs become "oil-logged," oedema occurs, and phagocytic cells migrate into the alveoli, where they engulf globules of oil. Usually there is no secondary infection, but this may arise should the oil be infected with virulent bacteria on its passage to the lungs. The relative toxicity of various oils has been investigated experimentally on laboratory animals (Pinkerton, 1927). Animal oils, such as cod-liver oil, chaulmoogra oil, and cream, are highly irritating, while pure vegetable oils are considerably less so.

The case of lipoid pneumonia recorded below caused some difficulty in diagnosis because the patient did not at first mention that he had been in the habit of douching his nasopharynx with liquid paraffin. From the first, however, anomalous features in the history and physical findings gave reason to believe that the patient was not suffering from any usual form of pneumonitis. When, after direct questioning, he admitted that he had used large quantities of paraffin for the treatment of nasal catarrh it became evident that he was suffering from this peculiar type of pneumonia, and it was possible by subsequent investigations to confirm the diagnosis.

Case History

A male caretaker aged 54 was admitted to hospital on June 3, 1940, with a provisional diagnosis of pneumonia. He stated that his health had been normal until 1923, when he started work as a caretaker in a feather-curling factory. At this time he developed nasal catarrh, for which he was advised to use a nasal douche of salt water and thymol, and then to instil into his nose a small quantity of paraffin. His symptoms were but slightly relieved. In 1935 he attended hospital for examination, and nasal polypi were removed. After operation he continued the use of nasal douches followed by liquid paraffin. In his own words, he "flooded the nose frequently," using as much as 3 oz. daily.

In 1937 he began to suffer from attacks of breathlessness and bronchial catarrh. Attacks were usually apyrexial; on some occasions they were preceded by shivering, sweating, and general malaise, and were accompanied by an irregular temperature not higher than 100° F. During the attacks, which occurred at intervals of two or three weeks, he felt great tightness in the chest, had a "rattling" cough, and was so breathless that he was unable to move from his bed for several days. Towards the end of attacks he would expectorate white "jelly-like" sputum. Between attacks he was able to work, though he became dyspnoeic on exertion and had a chronic cough. When he was very breathless he noticed palpitations. His ankles had never become swollen.

Four days before admission to hospital breathing became extremely difficult; on this occasion he had not much cough. The doctor who examined him at his home found an impaired percussion note at the base of both lungs, with numerous moist sounds. Sulphapyridine (M & B 693) was given in full doses for forty-eight hours without effect.

On admission his temperature was 99.4° F., the pulse 104 and irregular, and the respiratory rate 35. His state of nourishment was good. He was in acute distress on account of breathlessness, and was slightly cyanosed about the lips, nose, ears, and finger-tips. Labial herpes was present. The tongue was moist and furred. In spite of respiratory distress he did not have the gravely ill and toxic appearance of a pneumonia case. The neck veins were not engorged, nor were there any other signs of cardiac congestion. The chest movements were poor but equal on the two sides. The percussion note was impaired at the right base as high as the middle of the scapula and to a less extent at the left base. Coarse crepitations were audible over these areas. No tubular breathing or pleural friction sounds were heard. Vocal resonance was diminished at the right base. The heart was normal in size; its rate was 104, and irregularity due to numerous extrasystoles was present; no murmurs were audible. The blood pressure was 130/80. No abnormal constituents were present in the urine, and examination of other systems was negative.

Radiologically the chest appearance was consistent with a bronchopneumonia mostly affecting the bases. Shadows were particularly marked in the region of the hila. The sputum appeared to be mucoid, and in water small globules of oil, in addition to the normal air bubbles, could be seen. Direct films of sputum showed globules of free oil to be present.

The sputum was examined by Dr. C. F. Barwell, whose report was: "Copious very tenacious sputum, mainly mucoid, with purulent streaks. The mucoid fraction shows abundant lipophage cells and accumulations of extracellular oil globules, the larger visible microscopically. Pus cells with moderate numbers of Gram-positive cocci in pairs and short chains and Gram-negative diplococci are present in the purulent streaks, of which culture yields profuse *Neisseria catarrhalis* and scanty growth of a *viridans* streptococcus."

Progress.—After the patient's admission to hospital the pulse gradually became normal in rhythm. The temperature remained normal except for an occasional rise to 99° F. Severe dyspnoea lasted for ten days; after this he was able to sit up in a chair, and only became breathless if he attempted to exert himself. Improvement in physical signs lagged behind subjective improvement, and an impaired percussion note is still present at both bases together with coarse rales. Radiologically there is some clearing of the earlier shadows, but only to a limited extent. The sputum still shows numerous lipophages. He now feels well. It appears that the phase of secondary infection is at an end but that oil is still present in the bases of the lungs, and this produces mechanically the existing physical signs.

Comments

The diagnosis of lipoid pneumonia has not infrequently been made at post-mortem examinations. Some of the reported cases of "giant-cell pneumonia" and "desquamative pneumonia" may possibly have been due to the aspiration of oils. In any unusual type of pneumonitis it is worth while excluding that possibility, which can usually be done simply enough by direct questioning. The use of nasal oil may not be mentioned spontaneously as it is often considered an irrelevant point.

In lipoid pneumonia radiographs of the chest are not pathognomonic, but the diagnosis may be confirmed by the examination of the sputum and the finding of free oil globules or lipophages. In cases which are complicated

by secondary infection and thus have a bacterial bronchitis or pneumonia the usual treatment for these conditions should be applied.

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Pinkerton, Henry (1927). *Amer. J. Dis. Child.*, **33**, 259.

COMPARISON OF THE TOXICITY OF TRYPARSAMIDE AND NEOCRYL IN THE TREATMENT OF NEUROSYPHILIS

BY

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A preliminary account of neocryl (sodium succinanilomethylamide-*p*-arsonate), together with some clinical and laboratory evidence of its effect on syphilis in all stages of the disease, was published by Yorke and others in 1936. While it was never intended that neocryl should be used in the earlier stages, evidence was produced that its spirochaeticidal effect was greater than that of tryparsamide when infectious lesions were treated by these drugs alone.

Glyn-Hughes's Conclusions

Glyn-Hughes (unpublished) studied the effects of these pentavalent arsenicals in cases of neurosyphilis. His study embraced 77 cases (11 G.P.I., 15 taboparesis, 25 tabes, 26 neurosyphilis), and in those treated solely by pentavalent arsenicals—59 in all—his conclusions were as under:

G.P.I.—4 cases were treated with tryparsamide and 7 with neocryl. All but one deteriorated and later required asylum treatment. One patient treated with neocryl showed improvement. It is concluded that the influence of tryparsamide and of neocryl in general paralysis with pronounced mental symptoms is very small.

Taboparesis.—5 cases were treated with tryparsamide: 1 patient was unaffected and died; 2 showed definite improvement, but 1 died later; 2 showed slight improvement, but 1 who had some degree of optic atrophy at the beginning of treatment became blind and died. 6 cases were treated with neocryl: 5 showed definite improvement, but 1 defaulted and relapsed later; the remaining patient had pronounced mental symptoms and, although he received much treatment, deteriorated and was admitted to an asylum. It is concluded that neocryl is superior to tryparsamide in taboparesis though not universally successful.

Tabes.—12 cases were treated with tryparsamide: 4 showed marked improvement; 3 were slightly improved; the remaining 5 patients were either unaffected or became worse and died. 13 cases were treated with neocryl, 2 of these being in the advanced stage: 11 cases were definitely improved (in fact, 5 of these patients were able to resume their work, which they had been compelled to give up owing to their condition); 2 advanced cases, mentioned above, deteriorated, and these patients died.

Early Neurosyphilis.—4 cases were treated with tryparsamide: 1 improved greatly and 2 others to some extent. 8 cases were treated with neocryl: 7 improved considerably and 1 improved to some extent but defaulted later.

In tabes and early neurosyphilis, therefore, treatment with neocryl was more successful than with tryparsamide, although both drugs were of much value.

Glyn-Hughes also mentions that 90 cases had been treated with neocryl without any damage to the optic nerve; and, indeed, optic atrophy previously present did not progress, whereas tryparsamide seriously damaged the eyes of 11 patients out of a total of 46, actual blindness supervening in some of these.

The Present Investigation

Our series consists of over 570 cases treated between 1936 and July, 1939, with either tryparsamide or neocryl, or occasionally with both at different times. Included in it are a number of cases suffering from interstitial keratitis and of late cases in which a suspicion of neurosyphilis, without serological evidence, existed. The standard dose of each drug was 3 grammes intravenously once weekly until 30 grammes had been administered; but in a few cases, owing to age, infirmity, or other condition calling for caution, smaller doses were given. Approximately 8.5 kg. of each drug was employed in the treatment of the cases under review. It should be noted that neocryl is rather less soluble than tryparsamide, but 3 grammes can easily be dissolved in 20 c.cm. of distilled water.

A recent survey of the records of this series of cases, made at least twelve months after the end of treatment, has confirmed the early impression that the therapeutic results obtained with neocryl are in no way inferior to those obtained with tryparsamide. In view of this fact it seemed of importance to make an analysis of the toxic manifestations of the two compounds. The cases were unselected, but it must be remembered that early optic atrophy has always been considered an absolute contra-indication to tryparsamide therapy unless the neurological condition of the patient necessitated risks being taken. As the work progressed and it became gradually realized that neocryl was relatively harmless, this compound was chosen for cases exhibiting visual disturbance, and eventually a state of affairs was reached when neocryl was given without hesitation to all cases, even when there was evidence of optic atrophy.

TABLE I.—*Summarizing the Toxic Manifestations observed in 256 Cases treated with Tryparsamide*

Type	No. of Cases	No. showing Toxic Signs Before Receiving 10 gm. of Drug	Total No. showing Toxic Signs	Percentage showing Toxic Signs	Toxic Reactions: Jaundice	Dermatitis	Visual Disturbance	Visual Damage	Vomiting	Others	Total
G.P.I. ..	30	2	3	10	1	0	1	1	0	0	3
Tabes ..	115	23	49	43	10	8*	23	4†	4	5	54
Taboparesis	11	1	2	18	1	0	0	1†	0	0	2
Neurosyphilis	45	6	17	38	4	4	10	4	0	0	22
Late syphilis	55	4	7	13	2	0	2	1†	2	0	7
Totals ..	256	36	78	30	18	12	36	11	6	5	88

*One developed purpura.
†One became blind.
N.B.—47 out of the 88 reactions affected vision.

TABLE II.—*Summarizing the Toxic Manifestations observed in 314 Cases treated with Neocryl*

Type	No. of Cases	No. showing Toxic Signs Before Receiving 10 gm. of Drug	Total No. showing Toxic Signs	Percentage showing Toxic Signs	Toxic Reactions: Jaundice	Dermatitis	Visual Disturbance	Visual Damage	Vomiting	Others	Total
G.P.I. ..	58	0	3	5	0	1	0	1*	1	0	3
Tabes ..	90	1	7	8	3	0	0	2*†	1	1	7
Taboparesis	31	1*	3	10	2‡	0	0	1*	0	0	3
Neurosyphilis	50	4	9	18	2	4	0	0	3	0	9
Late syphilis	85	1	5	6	2	2	0	0	1	0	5
Totals ..	314	7	27	9	9	7	0	4	6	1	27

* One had optic atrophy before treatment and the visual condition deteriorated; 9 other cases with optic atrophy were treated without ill effect.
† One suddenly became blind.
‡ One died of toxic jaundice.

The toxic reactions were both immediate and remote; as shown in the two tables they were considerably more frequent in the tryparsamide series than in the neocryl group. The commonest immediate reaction was nausea or actual vomiting, and this was in most cases easily controlled by premedication with glucose. Nitritoid crisis was never encountered. Some patients complained of vague body pains in the first twenty-four hours after injection, but these seemed to be of little moment and no ill effects were observed on continued administration of the drug. The later effects comprised jaundice, dermatitis, albuminuria, neuritis, herpes, and visual disturbance or damage.

One death occurred in a taboparetic who had received 57 grammes of neocryl and developed jaundice. Purpura was seen in a case of tabes under treatment with tryparsamide.

In the event of visual disturbances, such as the sensation of flashing lights or shimmering vision, the drug was withdrawn and the patient kept under observation by the ophthalmologist. If permanent damage was reported the same drug was not given, but if no damage was apparent treatment by pentavalent arsenicals was restarted with caution, and preference given to neocryl. Neocryl did not cause any functional visual disturbance, but in one case after nine doses of 3 grammes sudden and complete blindness occurred. The blindness which followed in 3 cases treated by tryparsamide was gradual in its development. In 3 cases optic atrophy present before the administration of neocryl became worse, but in 9 other known cases no ill effect was produced.

Summary and Conclusions

A series of 570 unselected cases were treated either with tryparsamide or neocryl. The drugs were given in equal amounts, and 256 received tryparsamide and 314 neocryl.

About twelve months after the work had been completed a survey was made of the records with a view to comparing the therapeutic effects and toxic manifestations of the two compounds. This survey confirmed the earlier impression that neocryl is not in any way inferior to tryparsamide as a therapeutic agent and that toxic effects from its use are much less common than are those caused by tryparsamide. Of 256 cases treated with tryparsamide 78 exhibited toxic manifestations, whereas of 314 cases treated with neocryl only 27 showed toxic signs.

Both compounds may cause jaundice, dermatitis, and other undesirable reactions that are seen after the administration of trivalent arsenicals; but it is chiefly in its relative innocuity to the optic nerve that the advantages of neocryl become apparent.

Visual disturbance occurred in 47 of the 78 cases which reacted unfavourably to tryparsamide: in 36 of these the signs were subjective, but in 11 they were objective, 3 of the latter patients becoming totally blind.

Neocryl could, however, be held accountable for only one case of visual damage. This occurred in a patient with tabes dorsalis, who unfortunately became suddenly blind; before treatment the patient did not complain of subjective signs and the acuity of vision was apparently good, but it was not possible to have his eyes examined by an ophthalmic surgeon.

It would appear from this analysis that neocryl is to be preferred in all cases of neurosyphilis in which the administration of pentavalent arsenicals is necessary.

REFERENCE

Yorke, W., *et al.* (1936). *British Medical Journal*, **1**, 1042.

RECEPTION OF AIR RAID CASUALTIES

BY

H. A. BRITTAIN, M.Ch., F.R.C.S.

AND

K. A. LATTER, M.D., M.R.C.P.

Successive air raids have led to the modification and improvement of the preconceived scheme for the treatment of air raid casualties in a large provincial hospital. The following scheme may serve as a basis for further modification according to the needs and capacity of various hospitals. As the hospital here discussed contains a first-aid post, in practice the majority of casualties have been arriving direct from the scene of the raid; but the scheme would also serve, with slight alterations, for patients already treated in a first-aid casualty post remote from the hospital.

Obviously some medical officers will have to fulfil dual roles. The rapid disposal of patients after a raid is of the greatest importance so that a surgeon or physician who has finished his examination in the out-patient department may be available in the wards or theatres. In the wards the patients are seen and examined by a senior surgeon and physician, and a preliminary note is taken at the bedside. It is suggested that a form similar to the one printed below may be found useful in briefly recording the pertinent data. The use of the figures for charting multiple injuries and lacerations offers a more rapid and comprehensive record than a long description.

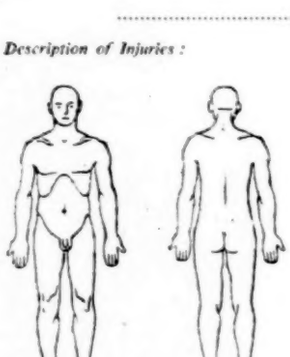
SURGEON .....

Name.....*Age* ..... *Sex* .....*Date* .....

Address .....*Time of Admission* .....

.....

Description of Injuries: *Notes:*



Degree of Shock:

Mild Moderate Severe

Treatment:	Time			
Morphine				
A.T.S.				
Fluids: Mouth ..				
Parenteral..				
O_2: Method ..				
Duration ..				
Flow ..				
Cortin				

Anaesthetic ..... Time .....

Operation .....

Immediate convalescence:

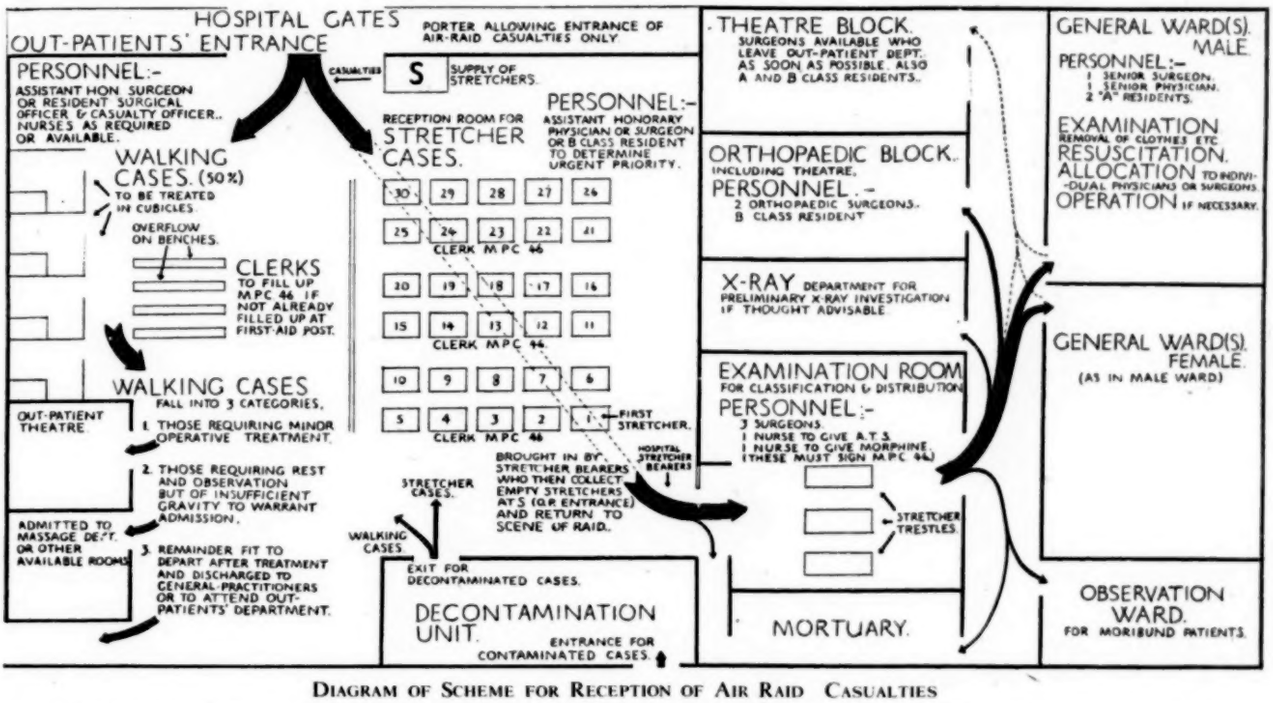

HOSPITAL GATES
OUT-PATIENTS' ENTRANCE
PORTER ALLOWING ENTRANCE OF AIR-RAID CASUALTIES ONLY
PERSONNEL:- ASSISTANT HON. SURGEON OR RESIDENT SURGICAL OFFICER & CASUALTY OFFICER.. NURSES AS REQUIRED OR AVAILABLE.
CASUALTIES
S SUPPLY OF STRETCHERS.
RECEPTION ROOM FOR STRETCHER CASES.
PERSONNEL:- ASSISTANT HONORARY PHYSICIAN OR SURGEON OR B CLASS RESIDENT TO DETERMINE URGENT PRIORITY.
WALKING CASES. (50%) TO BE TREATED IN CUBICLES.
OVERFLOW ON BENCHES.
CLERKS TO FILL UP M.P.C. 46 IF NOT ALREADY FILLED UP AT FIRST-AID POST.
30 29 28 27 26
25 24 23 22 21
CLERK M.P.C. 46
20 19 18 17 16
15 14 13 12 11
CLERK M.P.C. 46
10 9 8 7 6
5 4 3 2 1 ← FIRST STRETCHER.
CLERK M.P.C. 46
WALKING CASES FALL INTO 3 CATEGORIES.
OUT-PATIENT THEATRE
1. THOSE REQUIRING MINOR OPERATIVE TREATMENT.
2. THOSE REQUIRING REST AND OBSERVATION BUT OF INSUFFICIENT GRAVITY TO WARRANT ADMISSION.
ADMITTED TO MASSAGE DEPT. OR OTHER AVAILABLE ROOMS
3. REMAINDER FIT TO DEPART AFTER TREATMENT AND DISCHARGED TO GENERAL PRACTITIONERS OR TO ATTEND OUT-PATIENTS' DEPARTMENT.
BROUGHT IN BY STRETCHER BEARERS WHO THEN COLLECT EMPTY STRETCHERS AT S (G.P. ENTRANCE) AND RETURN TO SCENE OF RAID.
HOSPITAL STRETCHER BEARERS
STRETCHER CASES.
WALKING CASES
EXIT FOR DECONTAMINATED CASES.
DECONTAMINATION UNIT.
ENTRANCE FOR CONTAMINATED CASES.
THEATRE BLOCK. SURGEONS AVAILABLE WHO LEAVE OUT-PATIENT DEPT. AS SOON AS POSSIBLE. ALSO A AND B CLASS RESIDENTS..
ORTHOPAEDIC BLOCK. INCLUDING THEATRE. PERSONNEL:- 2 ORTHOPAEDIC SURGEONS.. B CLASS RESIDENT
X-RAY DEPARTMENT FOR PRELIMINARY X-RAY INVESTIGATION IF THOUGHT ADVISABLE
EXAMINATION ROOM FOR CLASSIFICATION & DISTRIBUTION PERSONNEL:- 3 SURGEONS. 1 NURSE TO GIVE A.T.S. 1 NURSE TO GIVE MORPHINE. (THESE MUST SIGN M.P.C. 46.)
STRETCHER TRESTLES.
MORTUARY.
GENERAL WARD(S). MALE. PERSONNEL:- 1 SENIOR SURGEON. 1 SENIOR PHYSICIAN. 2 "A" RESIDENTS. EXAMINATION REMOVAL OF CLOTHES ETC. RESUSCITATION. ALLOCATION TO INDIVIDUAL PHYSICIANS OR SURGEONS. OPERATION IF NECESSARY.
GENERAL WARD(S). FEMALE. (AS IN MALE WARD)
OBSERVATION WARD. FOR MORIBUND PATIENTS.

DIAGRAM OF SCHEME FOR RECEPTION OF AIR RAID CASUALTIES

Casualties are admitted at the out-patient entrance as indicated by the broad black arrows (top left). Walking cases so far have been approximately 50 %. They are treated in the cubicles on the left by either an assistant surgeon or a B class resident. They resolve themselves into three categories: (1) those requiring minor operations; (2) those requiring rest; (3) those fit to depart after treatment. The stretcher cases, if arriving in large numbers, are placed in a reception room, the first stretcher being situated furthest from the door so as not to block the passage-way. One medical officer is present to determine urgent priority; otherwise the cases pass into the examination room in the order of arrival. The hospital stretcher-bearers take them into the examination room, where they are placed on three trestles for a preliminary examination. This is undertaken by three surgeons, morphine and anti-tetanic serum being given where indicated. They are then sent to various destinations: the general wards or orthopaedic block, where a more complete examination takes place and resuscitation is carried out; the *x*-ray department; the theatre block; observation wards; or the mortuary. There is, of course, a separate entrance for gas-contaminated cases.

Treatment of Shock

It is essential next to estimate the degree of shock present, and to institute as rapidly as possible the appropriate treatment. Shock may be classified as mild, moderate, and severe according to the following scheme (Keith, 1919):

GROUP I

Mild Shock.—General condition good. Pulse rate between 90 and 110. B.P. 100 mm. Hg. No haemoconcentration.

The vast majority of patients falling into this category will respond satisfactorily to general measures:

(*a*) Absolute rest with freedom from manipulation. Severely traumatized extremities will require preliminary splinting, unless this has already been carried out at a first-aid post.

(*b*) Warmth applied by carefully protected hot-water bottles or the electric blanket: under conditions of winter, a special room kept at constant temperature may be used for this purpose. Hot fluids such as tea or coffee with two drachms of glucose added to each cup are useful. Morphine should be used to combat restlessness and pain, but in the absence of both these factors its use should be restricted, in view of its depressing effect upon the respiratory centre.

GROUP II

Moderate Shock.—General condition fair. Cold numb extremities. Pulse: volume diminished; rate, 120/140. B.P. below 90 mm. Hg. Haemoconcentration.

In this group there exists haemoconcentration, but the vascular system is still able to take up fluids, and the capillary endothelium has not lost its power of retaining colloids. Treatment will embrace general measures as in Group I, but in addition it is considered that plasma obtained by decanting the supernatant fluid from citrated blood is the most suitable and accessible intravenous fluid. It will frequently be found necessary to cut down upon the collapsed veins and insert a cannula. Time may be lost by attempting to introduce a needle into a vein which is almost emptied of blood, and, in so far as the blood viscosity is much increased, the flow through a wide-bored cannula is less apt to stop or to form clot.

As a guide to the effects of treatment red cell counts are probably the best indications of haemoconcentration. If, however, these are not easily available an estimation half-hourly of the blood pressure will serve. It is found that following treatment and the administration of plasma there is a decrease in haemoconcentration and a rise in the blood pressure. Within an hour or two, however, the condition of the patient may again become critical, requiring a second or even a third infusion.

GROUP III

Severe Shock.—Pulse almost impalpable—120/160. B.P. 60 mm. Hg or less. Haemoconcentration marked.

In patients who exhibit these signs the prognosis is grave. The vascular system has become leaky, and can no longer hold fluid in its channels; both electrolytes and proteins pass through the damaged capillary endothelium into the tissue spaces. Anoxaemia is thus accentuated, and a vicious circle is established. It is difficult to know at what stage this process is irreversible and therefore when treatment by plasma will be merely wasteful. The guiding principle should be to institute adequate shock measures before this final state of "decompensation" is reached.

Few cases have been experienced in which serious haemorrhage has been a major factor. It has therefore not been considered necessary to use whole citrated blood to any great extent.

Estimating the Severity of Shock

The following sheet has been prepared to tabulate the data which are important in estimating the severity of shock, and from it and the classification of the degree of shock one can more certainly apply a rational mode of

therapy. It is hoped that some such sheet will be standardized by the Ministry of Health for use throughout the hospitals of the country. The data accumulated would thus be available for collection and analysis by those concerned with clinical research into the treatment of traumatic shock.

SHOCK DATA

Name ..... *Date* .....
Time .....
T. .....
P. .....
R. .....
B.P. .....
R.B.C. .....
Hb. .....
Pallor ..... Pain ..... Thirst .....
Cyanosis ..... Apathy ..... Vomiting .....
Sweating ..... Restlessness .....
Notes :

Comments

Following these raids there appear to have been few patients in whom early operation has been instrumental in saving life. Prompt amputation of mangled limbs has given disappointing results. Less than 5% of patients have required prompt operation for excessive haemorrhage. Profuse arterial haemorrhage was unusual even in patients with severed extremities, possibly because of the accompanying severe shock or possibly because the completely divided artery retracts and becomes constricted. Perforations of viscera accompanied by other multiple injuries were extremely rare and of grave prognosis. The majority of wounds were treated by the direct application of sulphanilamide powder. Post-operative infection and pyrexia were exceptional.

Summary

A basic scheme for the reception and preliminary treatment of air raid casualties is shown in diagrammatic form.

Emphasis is laid on organization for the rapid transmission of patients to the wards.

Charts for preliminary note-taking and estimation of the degree of shock are given.

So far, our experience has indicated that postponement of operative treatment until adequate resuscitation has been achieved is imperative.

We wish to acknowledge that the original scheme, modified since by our experiences, was worked out by Mr. A. J. Blaxland, senior surgeon to the hospital.

REFERENCE

Keith, N. M. (1919). Med. Res. Cncl. Spec. Rep. Ser. No. 27, p. 36.

Clinical Memoranda

Pneumococcal Meningitis treated with Sulphapyridine

This case is reported for two reasons: (*a*) the large amount of drug given; (*b*) the number of the relapses in the course of the disease.

CASE RECORD

The patient was a male child aged 4 years, with a history that three days previously he had complained of tiredness and pain in the right ear, and had a temperature of 99°. A day later he was still pyrexial, had become listless and anorexial, and was complaining of headache. On the day before admission he had started vomiting, was able to retain water only by mouth, and was complaining of a pain in the neck.

On examination classical signs of meningitis were present, with the temperature 102° and the pulse 120. Locally, the drum of the right ear was thickened, but not bulging. Lumbar puncture was performed, the cerebrospinal fluid being under increased pressure, turbid, and microscopically showed many cells, predominantly polymorphonuclear leucocytes with Gram-positive diplococci, some capsulated. Culture gave a growth of pneumococci, which was typed and found to be Type 19. While awaiting these reports, chemotherapy with sulphapyridine (M & B 693) was instituted, 3¾ grammes being given in the first twenty-four hours. No clinical improvement followed and further lumbar puncture was performed, the fluid being under slightly increased pressure, and cells 450 per c.mm., with lymphocytes predominant. No organisms were to be seen in the centrifuged deposit, and no pneumococci were grown on culture. The dose of the drug was then increased to 6 grammes in the twenty-four hours. Marked improvement ensued, with total disappearance of neck rigidity, and with the temperature 98° and the pulse 100. A maintenance dose of 1½ grammes a day was prescribed, but an exacerbation occurred with temperature 103°, and return of all signs of meningitis; sulphapyridine was increased again to 4½ grammes daily dosage for five days. In all, four such exacerbations occurred with intervals of a week between each. (It should be added that these recurrences took place the days after the child had been visited by its father.) Each recurrence was less severe than the preceding one and was treated with anti-pneumococcic serum Type 19, 20,000 units intramuscularly on three occasions, accompanied by increased dosage of sulphapyridine.

Search for the infective focus was made: an exploratory myringotomy on the right drum was performed, with no resulting pus or serum. Proof puncture of the antra Highmori was negative, but a nasopharyngeal swab gave pneumococci on culture.

The white cell counts made at intervals were consistent with presence of infection. Thus during an exacerbation the total white count was 19,000 per c.mm. Differential count was: polymorphs, 50 per cent.; eosinophils, 2 per cent.; myelocytes, 5 per cent.; lymphocytes, 41 per cent.; monocytes, 5 per cent. The last count, with the patient convalescent, was: total white blood cell count 10,500 per c.mm., the polymorphs being 41 per cent. and the lymphocytes 50 per cent.

SUMMARY AND CONCLUSION

(1) A case of pneumococcal meningitis in a child aged 4 is described.

(2) Several relapses occurred.

(3) Large dosage of sulphapyridine (M & B 693) was necessary to effect improvement, 79.25 grammes being given in forty-six days.

(4) Despite this there was no evidence of agranulocytosis.

(5) Benefit of serum treatment is difficult to assess, as it was given concurrently with sulphapyridine.

My thanks are due to Dr. Pearse Williams for permission to describe this case; to Dr. Harré and Dr. Gwynne Evans for their reports; and to Dr. K. B. Rogers of St. Mary's Hospital for typing the pneumococci.

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London, N.W.10.

B. Brouwer (*Ann. Paediat.*, 1940, **154**, 121) states that the number of vaccinations in Holland in 1924 was about 155,000 but fell in 1938 to 20,833. The large number of vaccinations in 1929 (1,469,914) was due to the outbreak of 449 cases of small-pox with the death of twenty-three persons. The considerable decline in the incidence of encephalitis is explained by the smaller number of vaccinations. A survey of the vaccinations in Holland from 1924 to the first three quarters of 1934 inclusive shows that among 22,000 children vaccinated in the first two years of life there was only one case of encephalitis (which recovered), while among older children there was one case to every 3,600 vaccinations and one death to every 13,000 vaccinated. As regards the pathogenesis of post-vaccinal encephalomyelitis Brouwer is opposed to the so-called "theory of activation," but agrees with those who consider the encephalitis as a direct consequence of the vaccine virus. He also regards endogenous factors as an accessory cause of the encephalitis.

Reviews

PATHOLOGY OF THE SKIN

Practical Handbook of the Pathology of the Skin. An Introduction to the Histology, Pathology, Bacteriology, and Mycology of the Skin, with Special Reference to Technique. By J. M. H. MacLeod, M.D., F.R.C.P., and I. Muende, M.B., B.S., B.Sc. Second edition. (Pp. 416; 27 coloured and 125 black-and-white illustrations. 42s. net.) London: H. K. Lewis and Co., Ltd. 1940.

It is not given to many medical textbooks to remain in demand for thirty-seven years and nevertheless to wait that time before the appearance of a second edition. But that is what has happened in the case of MacLeod's *Handbook of the Pathology of the Skin*, the second edition of which (and in this the original author has enjoyed the collaboration of I. Muende) now lies before us. In 1903 Dr. MacLeod was a pioneer, and he justly claimed that no work had been produced on similar lines previously either in English or in any other language. The soundness of the foundation which he gave to the subject is no doubt one of the chief reasons why his work has persisted and worn so well. It is true that after the lapse of nearly forty years, during which our knowledge of cutaneous pathology has been enormously increased, it has been found necessary to make many changes and additions, and a few sections have been omitted; but the ground plan of the book remains the same, and it is still an expression of the personality of the original author, though we would not have it thought that we wish to minimize the contribution of his younger colleague. This is, of course, a book which appeals primarily to the dermatologist and also to the worker in the pathological laboratory; for them it may be said to be indispensable, but we would strongly recommend every medical student, indeed every medical man who remains, as he should do, a perpetual student, to read with close attention the chapters on the structure of the normal skin and on the types of pathological change which may affect it. The skin, though the most obvious of all human organs, still moves most mysteriously in many ways its wonders to perform, and the detailed account here given of its structure will throw much light on many cutaneous mechanisms some of which we are rather inclined through familiarity to take for granted and others to regard as inexplicable.

This is essentially a practical work, and the details given as to the various forms of technique employed in preparing specimens of skin for examination are full and precise; and here it may be remarked how little the modern technique for preparing sections has changed from what was prescribed at the beginning of the century. Perhaps the most notable addition to the former methods is the introduction of the Dopa technique by Bruno Bloch for the purpose of studying the production of pigment in skin. To the introduction of this method is due the modern view that skin pigment is derived not from haemoglobin but from a body of the tyrosine type. It is, however, a difficult subject, and for further details the reader must refer to the chapter on the pigment of the skin. As every handbook of pathology should be, this book is very beautifully illustrated, entirely by drawings, either coloured or in monochrome, of microscopical slides. In the original edition the drawings, which were always quite a feature of the book, were by the hand of the author. Some few of these have passed on to the new edition, but the vast majority of the illustrations are from the pen of Miss Alice Gretener: we do not think that they could be improved. They add enormously both to the beauty and utility of the volume, in a way that photomicrographs could never have done. We wish the new edition all the success it deserves.

ADVANCES IN PHYSIOLOGY

Annual Review of Physiology. James Murray Luck, Editor; Victor E. Hall, Associate Editor. Volume 2. (Pp. 501. $5.00.) Published by the American Physiological Society and Annual Reviews Inc., Stanford University, California. 1940.

It is with pleasure that we note the appearance of the second volume of this useful publication, all the articles in which have been prepared in the U.S.A. and Canada. The volume maintains, or even improves upon, the standard set by the first volume, which appeared last year. Some of the chapters deal with further extensions or different aspects of branches of the subject which were dealt with in Volume 1—for instance, developmental physiology, respiration, heart, autonomic nervous system, digestive system. Others deal with branches not considered previously—for example, the central nervous system, lymphatic system, the skin, exercise, defence mechanisms. Two of the articles are purely pharmacological, one dealing with the barbiturates and one with arsenicals. It should be possible to review every important part of physiology at fairly frequent intervals in this manner, and there can be no question as to the value of such a publication, which gives, particularly to the non-specialist, a short account of the salient advances in each branch in recent publications. There is, in some of the articles, an attempt to achieve the impossible, and to include so many references that the text becomes scarcely more than a rearranged bibliography, and as such is of little use to the more general reader, for whom it is presumed that the volume is produced. The difficulties of the compilers are, however, fully appreciated, and we are duly thankful to them for their attempts to enable us to find our way in the ever-growing labyrinth of modern literature on physiological topics—a task not lightened by what the editors describe as "the turbulent conditions that exist abroad." The withdrawal for some time to come of Europe from any constructive efforts in science will make future volumes, we expect, all-American in content as well as in authorship.

BROMPTON REPORTS, VOL. VIII

Brompton Hospital Reports. A Collection of Papers recently published from the Hospital. Volume VIII. 1939. (Pp. 238. 5s. 6d. post free.) Published by the Research Department of the Hospital, London, S.W.3.

It is fortunate that the war has not prevented the publication of the eighth volume of these "Reports," probably the best of the series. Although all but two of the papers have already been published elsewhere, the gathering of such a collection of reprints in convenient form and at a most reasonable price should prove of value to all chest physicians and surgeons. In keeping with the recent tradition of Brompton, the lead is taken by the papers of surgical interest. Mr. Tudor Edwards and Mr. Brock in two well-illustrated articles write authoritatively on the pathology, diagnosis, and treatment of pulmonary new growths, Mr. Brock paying particular attention to the benign varieties. In another article Mr. Tudor Edwards reports on four cases of vascular endothelioma of the lung. In yet another he discusses the modern principles in the treatment of bronchiectasis and gives results of 199 cases treated by lobectomy or pneumonectomy. The results in the younger age groups are so favourable that one might

pertinently inquire whether they also represent average results obtained by thoracic surgeons—a point of importance to the physician, who must decide whether surgical intervention should be suggested to the patient. The place of surgery in, and the principles of treatment of, pulmonary tuberculosis are discussed by Mr. J. E. H. Roberts and Mr. Price Thomas respectively, the paper by the former in particular containing much sound advice that should lead to improvement in the lot of the consumptive. It is a sad comment that the things he stresses should still have to be said at all. The collection of surgical articles is rounded off by inclusion of a paper by Dr. J. T. Hunter on anaesthesia in thoracic surgery.

Several of the medical papers are of practical interest. Dr. Margaret Macpherson's report on primary tuberculosis of the lung in children should help to popularize an aspect of tuberculosis that was fully worked out on the Continent many years ago. Dr. Erwin's paper on massive or absorption collapse in pulmonary tuberculosis deserves careful study. It is now several years since Jacobaeus drew attention to the importance of this phenomenon. Erwin adds to the problem some original thinking, and incidentally exposes the unsoundness of attempts to treat pulmonary tuberculosis by the production of absorption collapse. Two papers are included by Dr. Scadding, who has recently devoted detailed study to atypical forms of pneumonia, some of which may cause much difficulty in the differential diagnosis of pulmonary tuberculosis.

Much of interest will be found in the statistical sections of the volume. It is an effective comment on our lack of knowledge of haemoptysis that in an institution like the Brompton, with all its first-class facilities for investigation, no fewer than twenty-five patients should have been discharged in 1938 with the diagnosis "haemoptysis of unknown origin."

ARTHRITIS AND ALLIED CONDITIONS

Arthritis and Allied Conditions. By Bernard I. Comroe, M.D., F.A.C.P. (Pp. 753; illustrated with 200 engravings. 40s. net.) London: Henry Kimpton. 1940.

Dr. Comroe in this book has covered every form of arthritis and disease of the joints as well as some related rheumatic conditions such as fibrositis and sciatica. About a third of the volume is devoted to rheumatoid arthritis; the aetiology, symptoms, blood changes, and other features are described fully and in a clear and simple manner. Treatment is dealt with very thoroughly and includes the best description of physical methods in the treatment of arthritis that the reviewer has met with: practical, comprehensive, and full of suggestions for the home application of such methods. The prevention of deformity is described very fully, and illustrated by figures of splints, methods of strapping, etc., which will enable the practitioner to deal adequately with one of the most important and difficult problems in the management of arthritis.

While he advises the treatment of septic foci, the author appears to doubt whether this has any direct effect on the disease, though beneficial to the general health. A sound plan of vaccine therapy is laid down; it is stressed that vaccines and other treatment of the kind should only be used as adjuvant to physical methods. This applies also to chrysotherapy, which is regarded in America as a method not to be adopted lightly, and it is advised that before this is embarked upon the patient should sign a form exonerating the physician from any liability in the case of unfavourable results. The section on diet is valuable—clear and based on sound common sense.

In the description of rheumatic fever a series of 400 cases reported in Australia is mentioned; in 14 per cent. of these a rash, usually morbilliform in type, occurred, which is interesting in view of the rheumatic symptoms observed in many cases in the recent epidemic of rubella. Gonorrhoeal arthritis is fully described and the fact noted that involvement of the spine, the sterno-clavicular and mandibular joints is uncommon, which is contrary to the views formerly held and taught. The chapters on "The Painful Shoulder," "Painful Feet," and "Backache" contain a mass of information and practical methods of treatment not readily to be found elsewhere. The illustrations in this section particularly are excellent, and it forms a most useful guide to the treatment of these common and troublesome conditions. The author remarks that "many physicians dread to see the patient with backache walk into the office," but this book will rob the prospect of much of its anxiety. Ample consideration is given to all forms of treatment, and the author usually indicates those he has found of most value; he shrewdly observes of some of them that "the choice of therapy seems to depend in large part upon the field of specialization of the writer."

This is a book of great value and importance which can be commended to all general practitioners and especially to physicians interested in joint diseases. It is perhaps unfortunate that its high price will limit its circulation among general practitioners in this country, who would find it of the greatest help in the management of many of the common problems of their daily work.

"NOTTER AND FIRTH"

Notter and Firth's Hygiene. Revised by L. C. Adam, M.B., B.S., and E. J. Boome, M.B., Ch.B., M.R.C.P., D.P.H. Tenth edition. (Pp. 518; illustrated. 12s. 6d. net.) London, New York, Toronto: Longmans, Green and Co.

A number of medical officers who have reached the age of discretion will recall the earlier editions of *Notter and Firth's Hygiene*. They may even from time to time still take down from their shelves a time-honoured copy to revive their impression of some epidemic or other notable occurrence which either marked an epoch or heralded a reform. The first edition of the work was issued in 1894 and the ninth in 1921. Then there ensued a long hiatus, so long as to engender the fear that a good enterprise was ended. Such anxieties have, however, most happily proved unwarranted, for the book now emerges revised and in its tenth edition, which, while in parts as robustly paternal as ever, is nevertheless well brought into line with present-day methods. There are, for example, informative sections on maternity and child welfare, including the defective child, nursery schools, and child development, and on the welfare of the blind, and the teeth and oral hygiene, and speech and its disorders. Immunity and prevention are adequately discussed and the infective and general diseases are competently reviewed. A chapter, keyed to the hour, deals with first aid in accidents and injuries. Since no material change in the general arrangement is intended the book quite properly comes to us trailing some clouds of its ancient glory. We think, however, that in what is said on sewage treatment the revisers have been too much *laudatores temporis acti*. They devote copious space to Cameron's original septicizing procedure but dismiss in a short paragraph the more modern bio-aeration, which is not only of considerable scientific interest but also, as they concede, a method from which "excellent results are reported." The book will be welcomed by many who knew its precursors, and will be found of service by students and medical officers of more recent growth.

Notes on Books

Applied Pharmacology, by Prof. H. A. McGUIGAN of Illinois University, is one of the largest textbooks in English on this subject, for the volume contains 914 pages (Kimpton, 45s.). The author states that his aim has been to connect physiology, biochemistry, and pharmacology with the clinical application of drugs. Consequently he covers a wide range of medical sciences, and the subject-matter is of a somewhat unwieldy bulk. The chief quality that is demanded of a textbook of this type is that it should provide a clear general picture in true perspective, and it is not fair to expect detailed evidence regarding all the innumerable problems that are included in the wide field that it surveys. Prof. McGuigan provides a wealth of information, but the mastery of a large mass of data drawn from different sciences is a very difficult task, and it cannot be said that he has been completely successful, since it is difficult to pick out from his work the essential information that forms the basis of scientific therapeutics. The illustrations are good; about one-third come from Macleod's *Physiology in Modern Medicine*, and nearly one-third from Jackson's *Experimental Pharmacology and Materia Medica*.

In this technical and scientific age there must exist a distinct need for a dictionary comprehensive enough to provide definitions of most of the terms used in the course of activities in which one or other of the public is interested. Such a volume has been produced by W. and R. Chambers, Ltd. (London and Edinburgh, 15s. net) in their *Technical Dictionary*, under the editorship of C. F. TWENEY and L. E. C. HUGHES. The reputation of the firm as a provider of books of reference needs no emphasis, and in this handy publication of 960 pages the editors have collected as much material as could be expected within those limits. The scope of subjects is equally comprehensive: science, medicine, engineering, manufactures, and constructive work are dealt with in all their ramifications, and definitions of words used in psychology find a place. Each contributor is a specialist in his own department and has been charged with putting his own ideas in an explicit and easily readable form. Though not a pronouncing dictionary, the contributors have stated their own preference in cases where such an aid is helpful. The print is clear, the matter well arranged, and inaccuracies are few. The work may well be commended to the inquiring general reader.

A fourth edition of NOËL M. TIDY'S useful book for senior students *Massage and Remedial Exercises in Medical and Surgical Conditions* has been published by John Wright and Sons, Ltd., at 15s. It was not necessary to make many changes in the course of revision, and the 178 illustrations—many of them from photographs showing the exercises—once again form a valuable feature of the work.

Preparations and Appliances

A SIMPLE THIGH AMPUTATION RETRACTOR

Professor R. J. WILLAN, M.V.O., F.R.C.S., Professor of Surgery, Durham University, writes:

The retractor here illustrated for retracting the upper skin and muscle flap in thigh amputations has been in use in the emergency theatre of the Royal Victoria Infirmary, Newcastle-upon-Tyne, for over twenty years to my knowledge. I cannot say who invented it, or if it has ever been previously described; even if it has been described before I think it is well worth putting on record again because of its simplicity and utility. So useful is it where a quick amputation is required that I consider it should have a place in the theatre of every hospital, but particularly in a casualty clearing station. It consists of two concavo-convex oblongs of 1/8-inch thick sheet copper hinged by a brass screw. In the centre of a free edge of each oblong is a half-circle aperture. Each oblong measures 11½ inches long by 2½ inches wide, while the complete gap when the two sections are approximated makes a circle of 1 inch diameter. Near the aperture edge of each portion is a hole to take a small brass bolt screw and cap; this forms a loose hinge of the retractor.

After division of the thigh muscles down to the bone the hinged retractor is opened out and the circular aperture is occupied by the femur. After closing the two portions the assistant holds the extreme ends of the retractor and pulls upwards towards the hip-joint, the concave portion acting as

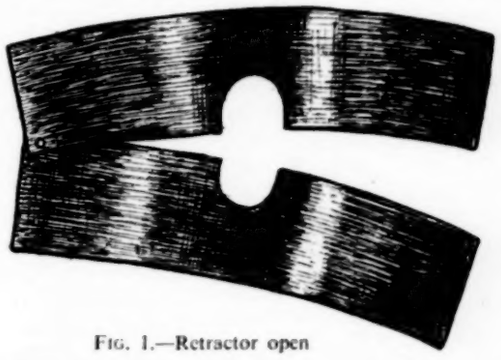

FIG. 1.—Retractor open

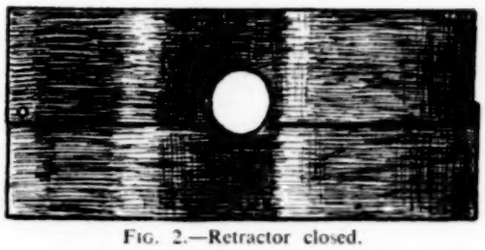

FIG. 2.—Retractor closed.

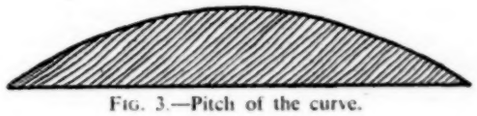

FIG. 3.—Pitch of the curve.

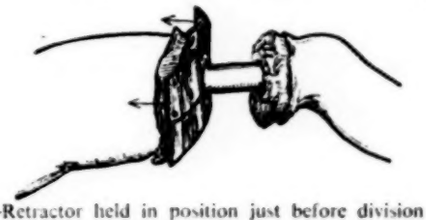

FIG. 4.—Retractor held in position just before division of the femur by the saw.

the muscle retractor. The surgeon then saws through the femur at the required level. The retractor protects the soft tissues from injury; it controls them much better than any other form of retractor; it conduces to the speed of the amputation; and the assistant's hands are not in danger of the surgeon's saw. A replica was recently made for me by a plumber at a cost of three shillings. I am indebted to Dr. Manuel Anderson for the illustrations.

BURGESS ELECTRIC VAPORIZER

An electric vaporizer, designed by Dr. F. K. Beaumont, is now on the market and can be recommended as being both convenient and efficient compared with the customary quart jug and towel. Perhaps its chief advantage is the ease and rapidity with which a flow of steam can be secured—in 5 to 10 seconds—under ordinary conditions, particularly desirable if the patient requires inhalations at frequent intervals. Provided normal saline solution or tap-water with a few added grains of common salt are employed, constant results in respect of amount and duration of the flow of vapour are attained. The vaporizer is automatically cut out immediately the water level falls below the elements about half an inch from the bottom. As the electric circuit is not completed until the lid is placed in position the risk of shock is eliminated. The cost of the apparatus is 15s. The makers are Burgess Products, Ltd., Hinckley, Leicestershire.

BRITISH MEDICAL JOURNAL
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TREATMENT OF WOUND SHOCK

During the world war of 1914–18 the problem of wound shock became one of outstanding importance and attracted the attention of many British and American clinicians and physiologists, whose work was co-ordinated and published by the Medical Research Council. Shock was divided into an immediate or primary form, thought to be of nervous origin, and a more important delayed or secondary form. Secondary wound shock was found to resemble shock from haemorrhage and was likewise shown to be a condition of circulatory failure due to diminished blood volume. In many instances the diminution was due to haemorrhage, which so often complicates injury. But, as in peacetime, cases were seen in which secondary shock followed severe injury and in which there was no obvious haemorrhage. An additional cause had therefore to be sought, and was apparently found by Cannon and Bayliss.[1] They demonstrated that in the experimental animal shock could be produced by severe trauma to a hind limb deprived of its nerve supply by nerve section. Shock did not occur, however, if the artery and the vein to the limb were ligatured, but supervened quickly when the ligatures were removed. They concluded, therefore, that injury led to the release of some substance which, gaining access to the general circulation, produced capillary dilatation and damage, with resultant loss of plasma from the circulation. The toxin released by tissue injury was thought to be histamine or some substance closely resembling it. Clinical experience was found compatible with this theory of the toxic origin of shock, which was widely adopted.

Experimental work has continued during the intervening years of peace, and Cannon and Bayliss's conclusions have been rejected. Thus Smith,[2] Parsons and Phemister,[3] O'Shaughnessy and Slome[4] have failed to find evidence of a toxic substance in the blood returning from a traumatized limb. Blalock[5] and Simonart[6] have confirmed that shock fails to develop when artery and vein to a traumatized limb are clamped, but have shown that shock does develop when the artery is released, although return of blood to the general circulation is prevented by occlusion of the vein. Blalock and his colleagues have demonstrated that loss of blood and blood plasma into the injured regions is quantitatively adequate to account for the circulatory failure resulting from trauma to a limb, from extensive burns, and from intestinal manipulation in the experimental animal. The view is being increasingly accepted that haemorrhagic and traumatic shock are fundamentally similar, but it is recognized that, whereas haemorrhage is a relatively simple condition, shock after extensive injury is a state resultant from many factors other than loss of fluid from the circulation; wartime experience has emphasized the importance of pain, of prolonged exposure to cold and wet, of fatigue, and of dehydration in its genesis.

The changes wrought in our conception of shock, and the advances in treatment effected since this country was last at war, have made it desirable that the profession should have new guidance in the treatment of wound shock, and the Medical Research Council's first war memorandum,[7] issued last week, is devoted to this purpose. This little pamphlet provides a brief account of present views concerning the nature of wound shock and a succinct guide to the measures that should be taken to prevent and treat it during the various stages in the patient's transport from the field to the military C.C.S. or civilian Casualty Receiving Hospital. Stress is put on the importance of controlling haemorrhage, protecting from cold, splinting injured limbs, relieving pain by morphine, and of combating dehydration, and on the desirability of delaying operation until shock has been successfully treated and of avoiding chloroform as an anaesthetic. These points were all well recognized by the end of the last great war. The new memorandum lays the greatest emphasis on the importance of recognizing shock in its early stages and of prompt transfusion of whole blood, plasma, or serum in amounts sufficient to restore to normal the depleted blood volume. Of all measures in the treatment of shock this is probably the most neglected and the most important. It has been neglected in the past partly because of the difficulty of at once obtaining adequate amounts of blood, and partly because in the experience of some its results have been disappointing. The institution of an Army Blood Transfusion Service and of the depot system for storage and distribution of citrated blood and plasma and reconstituted serum now makes prompt and adequate supplies of these fluids available. When transfusion has proved disappointing in the treatment of shock it is probable that it has been delayed too long and that the amount of blood given has been inadequate. Studies of blood volume after haemorrhage by Robertson and Bock[8] and in shock by Keith[9] in the 1914–18 war showed that 25% of the blood volume might be lost before the arterial pressure fell, and that a further fall of 25% was commonly fatal. To quote from the pamphlet: "If measures to restore the blood volume are to prove effective, every effort should be made to apply them early, before the blood pressure has fallen below 90 mm. Hg or the pulse rate risen above 120. Moreover, the amount of blood, plasma, or serum transferred should be large enough to overcome the deficit [in blood volume]; at least two pints of blood are required in mild cases and four pints of blood in severe cases. To delay transfusion until signs of advanced shock have appeared is to wait until irreversible damage has occurred to blood vessels and central nervous system and no permanent restoration of the circulation can be achieved."

[1] M.R.C. Special Reports, No. 26. London, 1919. Cannon, W. B.: *Traumatic Shock*. New York, 1923.
[2] *J. Pharmacol.*, 1927–8, **32**, 465.
[3] *Surg. Gynec. Obstet.*, 1930, **51**, 196.
[4] *Brit. J. Surg.*, 1934–5, **22**, 589.
[5] *Surg. Gynec. Obstet.*, 1934, **58**, 551.
[6] *Arch. internat. Pharmacodyn.*, 1930, **37**, 269.
[7] M.R.C. War Memorandum, No. 1. H.M. Stationery Office, London 1940. (4d.)
[8] M.R.C. Special Reports, No. 25. London, 1919.
[9] Ibid., No. 27. London, 1919.

Experience of these newer methods of treatment should do much to clarify our conceptions of the nature of shock, and to prove or disprove the modern conception of the essential unity of haemorrhagic and traumatic shock.

STATE RECOGNITION FOR THE WORKS DOCTOR

The setting up of the Health of Munition Workers Committee during the last war—in 1915—was a landmark in industrial medicine. On the return of the country to a peace footing the scientific study of the human factor in industry was continued by the Industrial Fatigue Research Board, which (with the word "health" substituted for "fatigue") is still doing valuable work under the wing of the Medical Research Council. In the present war another big step forward has been taken—or at least the foot has been lifted to take it—in the Order recently made by the Minister of Labour and National Service requiring employers to engage a whole-time or part-time doctor or nurse, or both, wherever the Factory Department of the Home Office considers such appointment necessary. The necessity will be determined by the numbers of workers employed in a given factory or by special conditions appertaining to the works such as dangerous processes or isolated position. The Factories Act, 1937, already empowered the Secretary of State to require reasonable arrangements for medical supervision in factories where there is reason to believe that injury to health is being caused or is likely to be caused by conditions of work or where juveniles are subjected to risk. The new Order only translates into a decree what progressive employers have for many years been doing on their own initiative. Already three hundred or more medical men and women—fifty of them in a whole-time capacity—are attached to factories and business organizations in Great Britain, and the Association of Industrial Medical Officers is recognized by the British Medical Association as representative of practitioners in industrial medicine. The industries served by these practitioners range from coal mining to retail stores, from transport undertakings to chemical manufacture, from gas works to shipyards—a great variety of occupation with different degrees of exposure to risk, and imposing upon the medical officers concerned a good deal of adaptability and some specialization. Only about 10% of all workers are—or were, in the pre-war period—in concerns large enough to justify the employment of whole-time officers.

It is the conditions created by the present war output which have led to the decision to require the appointment of doctors in factories where this is thought necessary, but the importance of it lies in the fact that it signifies State recognition of preventive medicine as a function of works management. This is a policy which we hope will not be allowed to fade into the background when the need for war expedients is no longer felt. In the post-war period the industrial medical officer will be called upon to play fully as large a part as now in the prevention of disease and the promotion of the health and efficiency of the worker—perhaps even a larger part in view of the conditions of depression and intermittent employment which may then prevail. Mr. Ernest Bevin, with whose enlightened policy the recent contacts between the Trades Union Congress and the British Medical Association may have had something to do, realizes that only by providing a reasonable standard of medical care in factories can industrial fatigue and incapacity be prevented or dealt with at its beginnings. The medical and nursing services are only a part of the necessary organization, the other parts being the training and employment of welfare workers and the forming of safety organizations, and these also are being stimulated from Montagu House. One solid advantage of the Order will be in helping to convince the worker that the works doctor is not appointed solely in the interests of the employer. It is not, however, enough to welcome this official countenance for industrial medicine or to assume that because a few doctors and nurses are appointed all is well. Unless there is careful selection of people really suitable for dealing with the worker in his working environment the scheme will have no more than a nominal value. The danger is that casual or hasty appointments may be made merely to fulfil the letter of the Government requirement. Sir David Munro, the secretary of the Industrial Health Research Board, has suggested that to avoid indiscriminate selection, in which some employers would advertise the post and make their own choice, while others would refer to the Central Medical War Committee or the corresponding organization for nurses, a selection committee should be formed by the interested parties. A number of medical schools give their students the opportunity of learning something about the physiology and psychology of the industrial worker. At the London School of Hygiene and Tropical Medicine short intensive courses in industrial hygiene are given from time to time, and the Royal College of Nursing offers courses for nurses seeking employment in industry. Medical undergraduate teaching on the subject is brief and of recent introduction, following the recommendation of the General Medical Council a year or two ago.

It is unnecessary to enlarge on the valuable services a works doctor can render. He will, in the first place, be available for the immediate treatment of medical and surgical emergencies, or, to use the words of the new Factories Act, "first-aid treatment and medical treatment of a preventive character." Examination of recruits and of workers returning after illness or injury and their assignment to tasks suitable to their condition will come within his province. He will devise measures to protect workers exposed to special risks, to prevent fatigue, especially among juveniles, and to reduce accidents. The number of accidents in works—a large proportion of them of a minor character, but still entailing some loss of capacity and working time—is extremely large, and one authority, Dr. H. M. Vernon, has stated that even in well-managed factories the accident rate could be reduced by 30%, and in ill-managed ones by 60%. The efficiency of first-aid provision in the factory, including nowadays the A.R.P. service, will also be the responsibility of the works doctor. But perhaps his main task, the results of which are not easy to estimate, will be advisory to the management, the works council, or the welfare

department, as the case may be. He will advise on the hygiene of the factory, on the new and important problem of lighting restriction as affecting ventilation, on the arrangements for canteens and baths and rest periods. His advice on health matters will also be available to the individual worker, between whom and his insurance practitioner he will be a link—always, it is to be hoped, a friendly and co-operative one. He will be in touch also with the local hospital and the medical officer of health. When Mr. Bevin addressed the Section of Medical Sociology of the British Medical Association at Belfast in 1937 he expressed himself as reluctant to see a segregated industrial medical service established. He sketched out a scheme in which a group of insurance practitioners would pool their insured patients, the State or public authority would provide them with the material for a clinic, and the works doctors of the various factories of the district—themselves, if holding part-time appointments, being also insurance practitioners—would have access to the clinic and take part in the general practitioner service. That may introduce considerations which can hardly be thought out in wartime.

No doubt exclamations will be heard about the cost of the new service for industry, which has to bear enough burdens as it is. But if the medical service is properly installed and run it should be reckoned not as a cost but as an economy. The idea that innovations of this kind will ruin industry is contrary to all experience. It will more than pay for itself in the reduction of sickness and absenteeism and the maintenance of efficiency, cheerfulness, and courage. The question is, Can industry afford to do without it?

CEREALS AND RICKETS

Twenty years ago Mellanby showed that young dogs fed largely on cereals developed rickets. He thought that the greater rate of growth induced by eating cereals made greater demands on the elements required for bone formation and that these were not available in sufficient amounts in the cereal eaten. It was then found that oatmeal brought about the most severe degree of rickets, wholemeal wheat flour was nearly as bad, and white flour and rice were also rachitogenic, though not so strongly as the other two cereals. As these produced the same rates of growth, however, it was obviously not merely the rapid rate of growth which accounted for the rachitogenic action of the cereals. It was then shown that it was neither the relative nor the absolute amounts of calcium and phosphorus in the cereals that accounted for the differences in rachitogenic potencies of the cereals, and it was thought that the different cereals must contain different amounts of some rickets-producing substance. Certainly the effect could be destroyed by boiling the cereal with dilute hydrochloric acid. It could be wholly counteracted by giving sufficient vitamin D, and partly antagonized by giving calcium carbonate or phosphate in the diet. It was also demonstrated that malted grain such as oats had lost their rachitogenic activity, and that it was not the germination alone that brought this about but the subsequent autolysis. Templin and Steenbock[1] showed that in maize this autolysis was accompanied by a change in the phosphorus from an organic to an inorganic form, which they considered rendered it more available. Much of the organic phosphorus of seeds exists in the form of phytic acid (inositolhexosephosphoric acid) or as phytin (the calcium magnesium salt of this acid). Starkenstein[2,3] and Plimmer[4] had demonstrated that phytin is not directly absorbed from the alimentary canal but that it may be broken down there into inositol and phosphoric acid by bacterial action. McCance and Widdowson[5] observed that 20% to 60% of phytin eaten by human beings was excreted unchanged in the faeces. Bruce and Callow[6] regarded the unavailability of the organic phosphorus as the cause of the rachitogenic action of cereals, for they produced much less severe rickets by adding inorganic phosphates to the diets. Mellanby, however, was not satisfied with this explanation of the rickets-producing action of cereals, for the diets used by him had contained ample amounts of available phosphorus, and the addition of more inorganic phosphorus did not reduce their rachitogenic activity. He was inclined to think that phytic acid itself might be a positive antagonizing substance to calcification, particularly as it seemed to be more effective in diets that did not contain the very high calcium–phosphorus ratio of those generally used in animal experiments on vitamin D. Experiments recently reported by Harrison and Mellanby[7] prove that this is indeed so. Phytic acid and neutral sodium phytate exerted a strong rachitogenic action when given with a non-rachitogenic or slightly rachitogenic diet. The activity of certain doses of these compounds was comparable with that of oatmeal containing similar amounts of the compounds, and the phytic acid phosphorus fraction extracted from oatmeal itself and the purified neutral sodium phytate prepared from it had the same rachitogenic action. It was antagonized by adding calcium to the diet. Commercial phytin (CaMg phytate) was slightly antirachitic. The latest explanation, therefore, of the rachitogenic action of cereals is that it is due not to the unavailability of the phosphorus but to the fact that phytic acid precipitates the calcium salts of the diet and makes them unavailable. Only after all the phytic acid has been thus precipitated will further amounts of calcium be used for calcification.

[1] *Biochem. J.*, 1933, **27**, 2061.

OTOSCLEROSIS

The immediate substantial gain in hearing which was obtained in selected cases of otosclerosis when an opening was made in the long wall of the external semicircular canal encouraged Bárány, Holmgren, Sourdille, and others to continue the surgical treatment of this condition. The improvement, however, was only brief; after several weeks the hearing had returned to its previous level owing to obliteration of the fistula by new bone or dense fibrous-tissue formation. The problem has therefore been to devise a method whereby the window in the external canal will remain sufficiently open to allow the sound waves to reach the membranous labyrinth. Holmgren and Sourdille have described two- and three-stage operations, in which they endeavoured to cover the fistula with a membrane, but their published results have not so far warranted any widespread adoption of their method. In a recent paper Julius Lempert[8] describes a one-stage operation he has devised, which consists essentially in creating a fistula into the horizontal semicircular canal and covering the fistula with a plastic flap composed of the skin of the superior and posterior long wall of the meatus intact with Shrapnell's membrane and the pars tensa. He performed this opera-

[2] *Biochem. Z.*, 1910, **30**, 56.
[3] *Arch. exp. Path. Pharmak.*, 1914, **77**, 45.
[4] *Biochem. J.*, 1913, **7**, 43.
[5] Ibid., 1935, **29**, 2694.
[6] Ibid., 1934, **28**, 517.
[7] Ibid., 1939, **33**, 1660.
[8] *Arch. Otolaryng.*, Chicago, 1940, **31**, 711.

tion on 120 patients, in 69 of whom the fistula has remained open with the restoration of hearing in the affected ear. Tinnitus, where present, has been completely relieved—a striking advantage of the operative treatment over the customary electrical hearing aids. In a further ten cases hearing has been materially improved for conversational purposes, but has not reached the level necessary for the restoration of complete hearing. A further operation has been successful in fourteen out of thirty-one patients whose condition was not permanently improved after the first. Altogether serviceable hearing has been restored by this technique in about 80% of properly selected cases of otosclerosis. It is too early yet to assess the ultimate progress of the disease after operation, but such evidence as there is would suggest that the loss of hearing is retarded and perhaps even checked by successful fenestration of the external semicircular canal. It must, however, be stressed that this operation demands a standard of skill, anatomical knowledge, and judgment which could only be acquired by very considerable practice and experience. The best results from this method will be obtained by those otologists who, in addition to extensive experience in all surgery of the temporal bone, have some knowledge and understanding of the principle of reconstructive plastic surgery.

ELECTROPHORESIS OF ADRENALINE IN ASTHMA

By reason of its potency, its immediate action, and the absence of pathological changes following prolonged use adrenaline is recognized to be the most effective drug for alleviating asthmatic states. Its drawbacks are that it is ineffective when given by the mouth, the period of action is short, and at times it may give rise to disagreeable effects from an exaggeration of its normal physiological actions; or, after prolonged administration, it may fail to produce any beneficial results. It is usually given subcutaneously, but inhalation of adrenaline vapour has brought relief, the strengths employed varying from 0.1% to 1.0% (the usual strength advised nowadays), and on some occasions even up to 10%. By either method, however, the action of the drug is of short duration and each subsequent administration appears less effective. Keeney[1] advised intravenous injections of 100 c.cm. of 50% sucrose to which was added 0.5 c.cm. of 1 in 1,000 adrenaline hydrochloride—the adrenaline to relieve the muscle spasm and constrict the mucosal blood vessels, the hypertonic solution to increase the osmotic tension in the circulating blood, thereby drawing the excess fluid from the tissues into the blood stream. The next step was to try to delay the action of the adrenaline, allowing a small amount to be liberated from a depot over a long time. Keeney, Pierce, and Gay[2] suggested a 1 in 500 suspension of crystalline adrenaline in purified peanut oil to be given intramuscularly, the dose being 1/2 to 1 c.cm. of a solution containing the equivalent of 2 mg. of adrenaline per c.cm. Untoward reactions were reported,[3] and Spain, Strauss, and Fuchs[4] recommended as non-toxic and non-antigenic a slowly absorbed gelatin–adrenaline mixture 1 in 500, to be given in the same doses subcutaneously. More recently Abramson[5] has suggested treating severe asthma by electrophoresis of adrenaline. He bases his line of treatment on the following facts: (*a*) many pharmacologically active drugs may be administered electrophoretically at rates similar to those which obtain in the intravenous drip technique without the disadvantages of venepuncture; (*b*) adrenaline is known to be transported by electrophoresis into the human skin, with typical local blanching; and (*c*) the local reaction of vasoconstriction in such depots formed in the skin allows absorption to take place over many hours. Abramson found that ordinary 1% solutions of adrenaline hydrochloride were too acid, but experiments showed that adrenaline dihydrogen phosphate with a *p*H of 4 to 5 was suitable. Equivalent quantities of adrenaline base and phosphoric acid are added together, so that the final concentration of adrenaline is approximately 1%. The *p*H is adjusted colorimetrically. The area of application in the arm or leg is at least 30 sq. cm., but preferably about 50 sq. cm. The adrenaline solution is placed on cotton, and each area is given a current of 5 to 7 milliamperes for ten to fifteen minutes, with usually three areas being covered successively in a single treatment. Experiments are progressing to decrease the time of thirty to forty-five minutes to ten to fifteen minutes, with a current equal to 15 to 20 milliamperes, and even to employ three positive poles simultaneously. The blanching due to the electrical transport of the adrenaline may last more than five hours without any injury to the skin, and it is estimated that by this method an absorption rate of approximately 1 mg. an hour may be achieved. By using larger areas and increasing the current and time it is conceivable that larger doses may be given. Any constitutional reactions obtained (such as tremor, palpitation, or headache) have been less than those following a subcutaneous injection of 5 minims of the 1 in 1,000 solution of adrenaline hydrochloride. Abramson appends reports of nine cases in which were ordered, in addition to the electrophoretic treatment, 3/8 grain ephedrine sulphate in capsules according to need, injections of 5 to 7 minims of adrenaline hydrochloride, adrenaline in oil intramuscularly, and aminophyllin intravenously. Most of the patients were treated in hospital. Though the results recorded are not very dramatic, they represent a genuine attempt to overcome some of the disadvantages of adrenaline injections.

[1] *Johns Hopk. Hosp. Bull.*, 1938, **62**, 227.
[2] *Arch. intern. Med.*, 1938, **63**, 119.
[3] *J. Allergy*, 1938–9, **10**, 459.
[4] Ibid., 209.
[5] *Arch. phys. Ther.*, 1940, **21**, 261.

THE CARE OF THE CONVALESCENT

"The ultimate aim of medical service is to restore the person who has suffered from a disease or an accident to his place in society ready and able to resume and carry on his former duties, responsibilities, and recreations. When this is successfully accomplished the patient may then consider himself cured. This is what the patient hopes for and what he has a right to expect from the medical profession." These sentences are from one of the opening addresses at a conference on "Convalescent Care" held under the auspices of the Committee on Public Health Relations of the New York Academy of Medicine. The conference was held in November, 1939, and its proceedings are now published under that title.[1] They are worth attention, for though, as in all such discussions, many observations are uttered which have no particular value, useful suggestions are made; and, in this instance, attention is directed to an aspect of medical work which is described in a foreword by the President of the New York Academy as "sadly neglected." This neglect is tending to disappear, and recently a good deal of thought has been given to convalescence and especially to rehabilitation after fractures and surgical operations. It is now more widely recognized that after the operation itself or the setting of the fracture has been successfully accomplished the patient cannot, without much serious attention, be safely left to recover; also that the period upon which the patient has then entered requires often even more skilled conduct. The care of convalescence has been called "the unfinished business of medicine," but the broad truth of

[1] *Convalescent Care*. New York Academy of Medicine, 2, East 103 Street, New York.

the quotation given above is being more fully accepted by medical practitioners. To be exactly correct, however, the statement needs some qualification. The "ultimate aim" therein described may involve the suggestion of a permanent modification of the patient's former way of life; or, even when this is not required, it may call for such a redirection of the patient's attitude to life that he is willing to resume its burdens. Stated in this more complete fashion it is clear that for the proper care of convalescence it is not enough that the patient should be sent to a so-called convalescent home, and that a place does not deserve to be so called merely because it is in the country. There are many more requirements. Perfunctory nursing and a rough supply of sufficient food are not enough; and even when the nursing is skilled and when expert attention is given to nutrition, it still has to be recognized that convalescence demands more and more attention to personality and less and less to disease. Hence it is the business mainly of general medical practitioners and of medical psychotherapists with the help, in many cases, of the trained social worker. Convalescence, too, is not a matter of routine. Its needs vary according to the nature of the illness or accident from which recovery is taking place, the previous state of health of the patient, and the patient's age, sex, and economic or industrial position. All these points are made in the course of the discussions set out in the well-printed volume under review. The several sessions of the conference were devoted to different aspects of convalescent care: "basic considerations," "various types of patients," "psychosomatic aspects," "social, financial, and administrative aspects," and the relations of convalescence both to old age and to chronic illness are not overlooked.

CANCER OF THE STOMACH

If the surgeon is seriously to influence the death rate from cancer of the stomach he must carry out radical operations in a much larger proportion of cases, and also diminish his post-operative mortality. Thus Mr. Reginald Payne[1] sums up the position as regards the one and only possible hope of cure which is at present open to the sufferer from gastric carcinoma. There is no other way of giving any chance of more than palliative treatment. What is the present position? Of 506 cases analysed by Payne and described in his Hunterian Lecture, only 10% could be radically operated on; of 351 cases submitted to surgery the result was fatal in 32%. Other figures quoted by Payne are equally disappointing, more especially when it is remembered that the incidence of cancer of the stomach is approximately equal to the combined incidence of cancer of the colon and of the rectum together. The crux of the matter is early diagnosis. Out of Payne's series, 400 of the 506 cases had a history of less than two years from the onset of symptoms to admission to hospital, the average being approximately eight months. Allowing, therefore, for the initial vagueness of onset in these cases and the indefiniteness of the symptoms in many cases, there still remains a period of several months' delay which, with increasing awareness of the problem, should be much reduced. It is this slow insidious onset, so easily mistaken for some simple or nervous dyspepsia, that is the main cause of the sad figures given by Payne, which show that in even the boldest hands gastrectomy is only possible in fewer than half of those coming to operation—and these represent but a small proportion of those admitted to hospital. It cannot be too strongly urged that any dyspepsia arising over the age of 40, and especially in a person of 60 to 70 years of age, must be thought of and investigated as a possible carcinoma of the stomach. The surgeon—and the patient—must have the opportunity of radical operation at an earlier stage of the disease, and the chance of conducting as thorough and careful pre-operative preparation as possible. Only by these two means will his mortality rate diminish and the hope of cure improve. Anorexia and loss of weight predispose to post-operative infection; dehydration and anaemia greatly increase operative risk; azotaemia and alkalosis make operation almost hopeless. Extra fluids, physical rest, glucose, gastric lavage, blood transfusion, and careful selection of anaesthetic are all measures for which time should always be given, and an extra week or two spent in such preparation may well make the difference between success and failure.

[1] *Brit. J. Surg.*, 1940, **27**, 740.

VITAMIN B_2 IN KERATITIS

Warburg's yellow enzyme, which is closely related chemically to vitamin B_2, serves as an oxidizing agent to the tissues, acting by breaking down oxyhaemoglobin to haemoglobin. It is believed that where no haemin substances are present in the tissue, as in the avascular cornea, oxidation within the cell is accomplished by the enzyme directly. These theoretical considerations have a strong bearing on the experimental and clinical observations by Kruse and his collaborators, who found that the absence of vitamin B_2 in a diet leads to keratitis and that administration of this vitamin leads to resolution of the lesion. This work, which was recently noted in these columns,[1] is now carried a step further by recent observations of Johnson and Eckardt,[2] who report clinical results in a series of thirty-six patients with rosacea keratitis to whom vitamin B_2 was given orally. Two of the patients had an adequate amount of the vitamin in their diet, but showed hypochlorhydria, and three more had both vitamin deficiency and hypochlorhydria. Thirty-two patients who had a vitamin deficiency only did well on doses of 3 mg. of vitamin B_2 daily, while the patients with hypochlorhydria showed remissions. It would appear, therefore, that rosacea keratitis may occur in patients with normal gastric secretion and diet deficient in vitamin B_2, and also in patients whose diet is not deficient but who manifest hypochlorhydria. What is not clear is the effect of vitamin B_2 on raising the acid level in the stomach. The fact that, experimentally, rats with vitamin B_2 deficiency developed keratitis more readily if the head and eyes were exposed to direct sunlight is of considerable interest and importance in view of the evidence that vitamin B_2 is biologically inactivated by light. This, and the fact that vitamin B_2 is easily destroyed when the *p*H is not on the acid side, tend to throw more light on the obscure relation between gastric function and corneal lesions. It is clear that a valuable addition to ocular therapeutics is emerging from the current studies on vitamin B_2.

In the *Journal* of July 13, 1940, we announced the proposed formation of an American hospital in England for the treatment of war casualties. The advance party of this hospital includes five orthopaedic surgeons, one plastic surgeon, one general surgeon, three nurses, and two secretaries, the party being under the guidance of Prof. P. D. Wilson. We understand that to begin with our American colleagues will work in E.M.S. hospitals. British medicine will not fail to recognize the generosity of these men who have come to help us in the common cause.

[1] *British Medical Journal*, 1940, **1**, 857.
[2] *Arch. Ophthal.*, Chicago, 1940, **23**, 899.

GUN-FIRE DEAFNESS

BY

E. R. GARNETT PASSE, F.R.C.S.

Surgeon Commander, R.N.V.R.

Since the outbreak of war many naval personnel have complained of deafness immediately following gun fire and bomb explosions. A careful study of these cases has revealed some interesting data.

Incidence

It occurs at any age and in men without history of previous deafness, familial deafness, or middle-ear infection; also in men without apparent nasal or post-nasal conditions responsible for obstruction of the Eustachian orifices. Most cases are unilateral; in bilateral cases one ear is affected more than the other.

The type of gun responsible for the majority of cases is the smaller type of 3-inch, 4-inch, 4.7-inch, or salute guns. Deafness does not occur in ratings operating the guns in enclosed turrets, but in those ratings whose duties take them outside the protective shield. The 4.7-inch guns are the worst offenders.

The number of rounds fired does not seem to matter. In some cases the patients state that they felt pain in the ear or ears at such-and-such a point of the gun fire—this may be after the firing of one shell or several rounds.

The position of the patient at the instant of firing bears some relation to the ear affected. The ear nearest to the mouth of the gun barrel would appear to be the one most frequently affected.

More than half the casualties were wearing cotton-wool plugs, though these may have been hastily and loosely applied. In many cases action has to be taken so rapidly that, although cotton-wool was at hand, no time has been available for the insertion. No case has yet presented itself in which rubber ear plugs have been worn.

Signs and Symptoms

After the action it appears that the majority of the gun crews are in a brief state of "auditory daze" lasting a varying time from seconds to minutes. During this stage a high-pitched ringing sound is invariably noted. In an endeavour to alleviate his deafness the patient may put his finger to his ear, and on withdrawal find that it is blood-stained. He either then or later reports to the sick bay, where, alas! not infrequently the ear is syringed in an endeavour to remove any cerumen or blood present in order to obtain a view of the drum. Giddiness is not complained of. It is often many days before the ship returns to port, when the patient is sent to consult an ear-nose-and-throat specialist. By this time he may present one of four conditions.

1. A more or less rapidly recovering nerve deafness with perfectly normal membrana tympani.

2. A nerve deafness which is recovering but slowly, and in which there is a slightly raised darkish red area on the surface of the membrana extending backwards from the umbo. It is noteworthy that I have not seen this in the anterior or superior portions of the drum.

3. A nerve deafness with a ragged linear tear of the membrana extending in a posterior direction from the umbo. This is often associated with some haemorrhage, seen in the form of dried blood clot on the floor of the auditory canal.

4. A nerve deafness associated with a perforation as in No. 3, plus middle-ear infection. In every case this followed on the ear being syringed.

Course and Duration of Symptoms

The loss of hearing over the whole range is very marked for the first twenty-four to forty-eight hours, and gradually the hearing returns together with a subsidence of the tinnitus. The upper register is the last to return. A small percentage retrieve their hearing to the same state as before the explosion, but by far the majority recover to varying lesser degrees. Several cases have presented themselves in which the gun-fire deafness was contracted during the last war and has persisted since. As might be predicted, in uncomplicated cases Eustachian inflation gives no material benefit.

From these observations we may deduce that, while no one is immune, gun-fire deafness is more prevalent in the absence of adequate ear plugs and where there is lack of protection from the direct blast of the "back-flash" by a gun shield or, in the case of bomb explosion, by the wall of a house, etc.

Cotton-wool plugs hastily rammed into the ears appear to give quite inadequate protection. It is strongly recommended that rubber ear plugs should be worn, on account of their efficiency, inexpensiveness, and rapidity and ease of application.

It cannot be too strongly stated that if blood is seen in the meatus syringing of the ear or ears is to be avoided until the rent in the membrana has had a chance to heal; this may take as long as fourteen days. In the meantime 2 to 3 drops of guttae sp. vini rect. instilled twice a day are all that is required. If cerumen is present in these cases a little olive oil may be instilled, but no attempt made to remove it by syringing.

Lastly, though complete recovery of hearing is unlikely, reassurance may be given that the greater part of the hearing will return and that the tinnitus will subside.

THE HOSPITAL WORLD

STATISTICS FOR 1938

The latest issue of *The Hospitals Year-Book*[1] gives evidence of no wartime thinning. Its twenty-three statistical tables spread themselves over 140 large pages, each table including anything up to seventeen columns, and the diligent student can learn, respecting any one of a thousand voluntary hospitals in the kingdom, the number of available and of daily occupied beds, the number of new in-patients and out-patients, the income and expenditure, and the amount per patient expended on provisions, on surgery and dispensary, on salaries and wages, and on domestic requirements. He may also learn the source of income, in total and per available bed, from voluntary gifts, patients' contributions, public services, investments, and legacies. The compilation suffers from two disadvantages. One is that about 200 hospitals fail to conform to certain minimum conditions in the way they present their accounts, and these have to be excluded from the statistical tables; the other is that the statistics relate to 1938, which seems a great deal more than two years ago. Although a pre-war year it was an unfortunate one for voluntary hospitals. The total expenditure was roughly £20,200,000, and the income £20,000,000—"result misery," as Mr. Micawber would say. This is the first deficit in a ten-year period. In 1934 there was a surplus of one and a half millions, in 1935 a surplus of one million, and in 1936 and 1937 surpluses of about half a million. It is true that the deficit for 1938 is only small, but it is an ominous advent for 1939, when there was a vast dislocation of normal hospital progress. It is mainly the large London hospitals, with 100 or more beds, which show deficits. Forty such hospitals have a deficit between them of £240,000; sixteen others show surpluses, but the total does not reach £100,000. The provincial hospitals are better off. They still in total have a surplus, though it is less than it was the year before.

Regionalization of Hospitals

One section of the *Year-Book* is devoted to the very live subject of regionalization, and descriptions are given

[1] *The Hospitals Year-Book, 1940.* Edited by R. H. P. Orde, O.B.E. London: Central Bureau of Hospital Information. (21s.; post free 22s.)

of regional activity in Birmingham, Liverpool, Manchester, Sheffield, Oxford and district, and Devon and Cornwall. In all these places the problems have been attacked with courage and considerable success, and isolated individual efforts and rivalries have been replaced by combination and a spirit of goodwill. The movement towards regionalization in the hospital world is inspired by the same purpose as in other social activities—namely, that independent local units of the same or a similar kind find themselves obliged by pressure of circumstances to combine in defence of their interests or the promotion of their cause. As Lord Sankey pointed out, two things are required: one is money, the other is the service of public-spirited men and women. With regard to the former, Lord Nuffield has set a fine example, and as for service, there has never been in the voluntary hospitals any lack of it.

An interesting feature of the book is an epitome of the financial arrangements between local authorities and voluntary hospitals in all parts of the country. An analysis is given of arrangements affecting sixty-two voluntary hospitals for the treatment of general medical and surgical cases. The scale of payment seems to vary considerably; also in only one of the sixty-two cases does the local authority make payment direct to the medical staff, and in only fourteen cases, apparently, is an allocation made to the medical staff out of the payments to the hospital. Similar particulars are given of arrangements affecting maternity patients at 126 hospitals; only in eighteen cases is payment made by the local authority directly to the medical staff, and in about twenty-five cases the hospital itself makes an allocation. The percentage which the medical staff receive, when they receive anything at all, is generally between 10 and 25.

The *Year-Book* adds to its usefulness by including a directory of voluntary hospitals, municipal and public assistance hospitals, maternity homes, mental hospitals, contributory and provident schemes, and charitable institutions. A vast amount of information of which hospital administrators stand in daily need is assembled within these ample covers.

The annual report of the curator of the Laboratory of the Royal College of Physicians of Edinburgh (Dr. A. Fergus Hewat) states that the investigation of statistics of cancer deaths in Scotland in the years 1931–7 has been completed. As compared with the period 1921–30 there has been a marked improvement in the incidence of cancer at certain sites, notably the buccal cavity and the uterus. A fall in cancer of the digestive organs may, in part, be ascribed to more accurate certification in respect of the primary location, and the increase in the figures for lung cancer is almost certainly due, in part, to improved diagnosis. Taking all sites together, the cancer mortality between ages 25 and 65 remained constant for men and fell by 8% for women. One general conclusion is that the urban excess which has been noted cannot be entirely explained by incomplete certification in the rural areas. The greatest urban excess is shown in cancer of the respiratory tract, and while this may be due to better diagnosis, the same can scarcely be said of cancer of the buccal cavity and the uterus, which come next in frequency, and where certification is likely to be relatively accurate. Thus a real urban excess would seem to exist. The other accessible sites, the skin and breast, do not show significant urban excesses, but the number of deaths is small and the existence of such an excess, therefore, is not excluded. Of bacteriological researches carried out in the Laboratory mention is made of a study of leucorrhoea, the commonest cause of which in pregnancy has been found to be an infection with *Trichomonas vaginalis*; the next in importance is an infection with the thrush fungus, *Oidium albicans*. The chemistry of vaginal discharge is being further studied, in particular for an estimation of the lactic acid content.

Nova et Vetera

TREPHINING BY NATIVES OF NEW BRITAIN

The following particulars relating to trephining methods used by the natives of New Britain during tribal wars were given me by Mrs. Parkinson, who settled there upwards of sixty years ago. She has seen skulls bearing the marks of healed trephine wounds, and has caused some such specimens to be forwarded to the Australian Museum of Anatomy.

The doctor—Tene A Babat, to give him his proper title—carefully washes the wound with the milk of a young coco-nut—*tirip*. He then cuts the skin in the middle of the wound with a bamboo knife. This knife, cut smooth and sharpened, was used by the natives before the introduction of European knives. The knife wound divides the skin into two halves. The doctor then scrapes around the wound with a *coto*—a black stone which the natives say "falls down from lightning"—that is, a meteorite. After that he blows inside the wound with a *kaur*, a bamboo pipe about fourteen inches long, to discover if any small pieces of skull are lying there. When the patient feels a pain in the part into which the doctor blows it is in indication that bone fragments will be found.

To extract the bone fragments the doctor uses a *kia*, a strip of coco-nut shell four to five inches long and half an inch wide. It is sharpened at one end. Scraping and blowing are carried on until all bone fragments are removed, the wound being washed all the time with *tirip* milk. The scalp flaps are then replaced and sewn up with a needle. This needle, called *takam*, is made out of a wing-bone of the flying fox and is cleaned and sharpened at the end. The thread is of banana fibre dried in the sun. It is like glistening thread, and is very strong. The wound is covered with banana leaf, and over that is placed the skin of the banana flower. *Meme na buai* is put over the leaves so that no air can get into the wound. This *meme na buai* is made of pepper, lime, and very young soft betel-nut chewed together. The whole head is covered with taro leaf and big round leaves of a bush called *paba*. A frame to protect the skull and the wound which is worked like a net is then placed round the head.

The patient is kept on soft food in order to obviate the necessity for moving the jaws. He must lie quietly for three days. Then the doctor removes the frame and examines the wound. When there is yellow matter inside and the patient complains of pain and has restless nights the doctor cuts the stitches with a bamboo knife, and blows into the wound and scrapes it until he finds the most painful part. He perhaps discovers one or more pieces of skull loose, removes the fragments, and sews the wound up, putting everything on in the same manner as on the first day. After a week or so, if the patient should not have felt any more pains during that time, a piece of very hard old coco-nut called *lama* is given him to chew. If he is unconscious of pain in the wound while he is chewing it is a good sign; it means that there are no more bone pieces left and that healing is taking place. The doctor then tells the relatives to prepare a feast as he is going to remove the frame.

In a case where the brain is slightly injured by a sling-stone the doctor would perform as usual, but would take out all the damaged parts of the brain tissue and then stuff the wound with a piece of *mal*. A *mal* is made out of a small tree, and, according to the variety of tree, may be reddish in colour or pure white. It is fashioned in the following manner. The outer skin of the wood of the tree is first scraped off. The wood is then pounded until it becomes wide. A kind of soft cord is loosened from the bark, and this is removed. The stick is again pounded. If it is not long enough pieces of it are joined together with the juice of the same tree. The *mal* is dried in the sun and is then ready for use. The *mal* is left in the wound for all time, and the skin grows over it. Another *mal* which is wrapped over the wound outside remains until the wound is healed, and then it is removed.

J. L. MEAGHER, M.B., B.S.

Frankston, Victoria, Australia.

Local News

ENGLAND AND WALES

The Hospital Regionalization Scheme for South Wales

A conference representative of voluntary hospitals, local authorities, and medical organizations was held at the Royal Infirmary, Cardiff, on July 26, when proposals for the regionalization of hospital services in South Wales were under consideration and the objects of the Nuffield Provincial Hospitals Trust were explained. Sir William Jenkins, who presided, recalled that the Sankey Commission of Inquiry into Voluntary Hospitals [which reported in May, 1937] recommended the regionalization of voluntary hospital services. The Provisional Central Council, which was then appointed by the British Voluntary Hospitals Association to give shape to the recommendation, had done useful work, but had been handicapped by lack of funds. Lord Nuffield, with characteristic foresight and generosity, had established a fund for the promotion of regional and divisional hospital councils throughout England, Scotland, Wales, and Northern Ireland. It was fundamental to the scheme that there should be co-operation between voluntary hospitals and local public health authorities. Considerable progress had been made, and it was hoped that the steps already taken in South Wales would lead to the early formation of a regional hospitals council for that area. Sir Farquhar Buzzard said it was essential that the re-planning of hospital services should not be delayed. The changes which the war would produce in economic and social conditions would be reflected in a largely increased demand for bed accommodation and hospital treatment. The Nuffield Trustees had appointed a Medical Advisory Committee, under his chairmanship, which would co-operate with the Regionalization Committee of the Trust in surveying the position of hospital services, with special reference to the medical aspects of the problem. The Trust had already received requests from a number of voluntary hospitals for an investigation of their existing services with the object of securing more co-ordination and increased efficiency in their respective areas. It was not the policy of the Trust to deal with applications for financial aid otherwise than through approved Regional and Divisional Hospital Councils. Alderman W. Hyde stated that Lord Nuffield's benefaction was intended to be the nucleus of a fund which would provide assistance for provincial hospitals on lines similar to the King's Fund in London. The Trustees were considering suggestions for augmenting the capital of the Trust, and had already begun negotiations with other bodies whereby additional funds would be allocated through Regional Hospital Councils. The activities of the Trust and the regionalization scheme would not affect the internal autonomy of individual hospitals.

It was stated at the meeting that proposals for the establishment of three Divisional Hospital Councils for South Wales had already reached an advanced stage. A Provisional Committee was appointed to prepare a scheme for a Regional Hospitals Council for South Wales with which Divisional Councils would be associated.

Maternity Statistics

At Queen Charlotte's Maternity Hospital last year the number of "booked" in-patients was 1,705, of whom 937 were primigravidae, and there were seven deaths—a mortality of 4.11 per 1,000. The proportion of stillbirths was 46.3 per 1,000, and of infant deaths 33.8. Among the 114 emergency cases there were three maternal deaths, twenty-seven stillbirths, and eleven infant deaths. On the district served by Queen Charlotte's 1,232 patients were delivered in their own homes, with one maternal death, and there were twenty-nine cases of maternal morbidity (using the Ministry of Health definition). In the isolation block, which was closed on the outbreak of war, 251 cases were admitted, of which 198 were of puerperal fever, and among these there were only six fatal cases. In the careful analysis given in the clinical report of the hospital every Queen Charlotte's case is described and classified according to the type of labour and the nature of any complication. Among the 191 cases in which there was induction of labour with spontaneous delivery three mothers died; twenty-two babies were stillborn and fifteen died. Among twenty-five cases of induced labour with forceps delivery one mother died, six babies were stillborn and one died. Caesarean section was carried out in fifty-two cases, with the death of one mother, three stillbirths, and two infant deaths. Out of 161 cases of albuminuria admitted four mothers died, the cause of death being respectively concealed accidental and post-partum haemorrhage, cerebral thrombosis, pulmonary embolism, and placenta praevia. A fifth patient died of thyrotoxicosis after being transferred to another hospital. Among these albuminuria cases there was spontaneous onset of labour in thirty-three; in 121 labour was induced, mostly by artificial rupture of membranes and pitocin; and in seven cases Caesarean section was done, though mostly for some other indication than the albuminuria—usually disproportion.

Correspondence

Toxic Jaundice from T.N.T.

SIR,—During the last war there were some 400 cases of toxic jaundice (acute yellow atrophy of the liver) caused by poisoning by T.N.T. (trinitrotoluene) between 1916 and 1918. As the manufacture and use of T.N.T. have now been greatly extended it is probable that cases of poisoning from this chemical will again occur in spite of the precautions taken, which include medical supervision of the workers. Toxic jaundice is a disease notifiable to the Chief Inspector of Factories under Section 66 of the Factories Act, 1937. I venture to ask the medical profession to keep in mind possible contact with T.N.T. when called upon to attend a case of jaundice the cause of which is obscure. The degenerative changes in the liver may not manifest themselves in the form of jaundice immediately, and it may be that the patient has been out of contact with T.N.T. for a considerable time before the symptom of jaundice manifests itself.

Forms for the notification of this and other diseases notifiable under Section 66 of the Factories Act will be supplied on application to the Chief Inspector of Factories, Cleland House, Page Street, Westminster, London, S.W.1.—I am, etc.,

JOHN C. BRIDGE,
Aug. 22. H.M. Senior Medical Inspector of Factories

Nurse Anaesthetists

SIR,—The Council of the Association of Anaesthetists will be greatly obliged if you will publish the enclosed letter. They believe that the matter is of sufficient importance to the medical profession to warrant its ventilation in your pages.—I am, etc.,

J. BLOMFIELD,
London, W., Aug. 22. Acting Secretary, for the Council.

To the Chairman of the Medical Committee,
Addenbrooke's Hospital, Cambridge.

SIR,—The Council of the Association of Anaesthetists, at a meeting specially convened to consider the matter, desired us to call your attention to the grave misgiving caused by your advertisement in the *Nursing Times* of July 6 for a nurse to be trained to act as anaesthetist to your hospital.

The Council, we wish to point out, is representative of this branch of medical practice in Great Britain. Further, they have been unable to trace any effort on your part to secure applications of qualified persons, either male or female, for this appointment. They are aware of wartime conditions, but are confident that anaesthetists can be obtained for a hospital of your reputation.

The institution of nurse-anaesthetists at a hospital of the standing of Addenbrooke's appears to us to be a retrograde step which is injurious to the public welfare. The responsibility for a patient under an anaesthetic cannot be safely entrusted to anyone who is not medically qualified. The anaesthetist has to bear the full responsibility so far as the anaesthetic is concerned, as has frequently been proved in the coroners' courts throughout the country. These duties cannot properly

be assigned to an unqualified person: that they had been so assigned, should accident befall, say, a patient serving in His Majesty's Forces, would create public resentment which would bear heavily against the hospital concerned. The fact that the coroner was approached before issuing the advertisement testifies in itself that the Committee are aware of this risk, though they have attempted to protect themselves in this way.

The Royal Colleges have recognized the specialty of anaesthetics by granting a diploma. This advance has been due to the labours of medical men devoting themselves to the study of anaesthetics. Further progress can only be achieved by encouragement of similar efforts.

We would point out that in Canada, where she used to be frequently seen, the nurse-anaesthetist has now been made illegal. In America her existence is deplored by many of the best authorities. We trust that you will agree that for England, which has in many ways been foremost in the advance of anaesthetics, to take a backward step by encouraging unqualified anaesthetists would be lamentable.

A copy of this letter has been sent to the Editors of the *Lancet* and the *British Medical Journal*.

Signed for and on behalf of the Council.

Z. MENNELL, President.
J. BLOMFIELD, Secretary.

Aug. 20.

The Council consists of the following: Drs. Z. Mennell, St. Thomas's, President; C. Hadfield, St. Bartholomew's, Vice-President; H. Sington, Great Ormond Street, Treasurer; H. Featherstone, Birmingham, Secretary; J. Blomfield, St. George's, Acting Secretary; J. Beckett, Dublin; J. Challis, London; A. Daly, London; F. Evans, St. Bartholomew's; J. Holroyd, Sheffield; A. Marston, Guy's; R. Minnitt, Liverpool; Prof. R. R. Macintosh, Oxford; Drs. I. Magill, Westminster; W. Phillips, Newcastle; V. Vessell, Royal Northern; H. Webber, University College.

War Noise

SIR,—To reply in full to the many important points raised by Dr. Redmond Roche in his letter (August 3, p. 166) would require more space than the most obliging editor could spare anyone in these days of paper shortage. But I would like, if I may, to assure him and your readers that the question of war noise has been thoroughly examined by the Noise Abatement League.

We hope to print and distribute shortly to all A.R.P. and first-aid posts full instructions as to how the individual may best protect him- or her-self from the noise of bombs and gun fire and from blast. This would have been done long ago but for the fact that the enormous number of these posts to be supplied throughout the country imposes a strain upon our wartime financial resources which we are quite unable to bear alone but which we hope that local authorities and well-wishers will share with us.

As regards stopping for ears and shaped ear plugs, we have had a number of various makes tested under fire, one of which, at least, fulfils all the requirements set out by Dr. Roche. Samples may be seen at the offices of the League, where full instructions as to their use and disinterested advice can always be obtained.—I am, etc.,

C. H. ROBINSON,
Hon. Secretary, Noise Abatement League.

45, Gower Street, London, W.C.1, Aug. 20.

X-ray Examination of Militiamen

SIR,—As one who has paid some attention to the question of mass radiography of recruits, I read the proposals of the Horder Committee (*Journal*, July 6, p. 31) with disappointment and regret; and, as one who each week examines up to twenty recruits referred by medical boards for investigation for possible tuberculosis, I cannot share the complacency shown by Dr. Sparks in your issue of August 24 (p. 266). The "difficult problem" which he thinks has been "solved to a large extent" includes the detection not only of the man who has suffered from tuberculosis but also, and especially, of the man who has active and unsuspected disease. The proposals under Heading 1 deal with the former group, and may prove reasonably effective if they can be put into practice; the proposals under Heading 2 deal with the second group, and my experience shows that they are insufficient. Quite recently, for instance, a man with an appreciable tuberculous lesion was passed in the top grade by a medical board at which exceptional care is taken to eliminate the tuberculous. He cheated the board by omitting to mention a small haemoptysis some two months previously. He would not have been able to cheat the miniature *x*-ray film. It would also, no doubt, have detected latent and quite unsuspected tuberculosis in another recruit who, within a few weeks of being similarly graded (by the same board), developed unmistakable symptoms and was found to have by no means inextensive disease.

In several countries miniature radiography has been tried, and in each it has proved to be not only a practicable but also a serviceable and an economic procedure, and I cannot but feel that if a progressive policy had been adopted several months ago in this country the difficulties could have been overcome and the beneficial results would by now be evident. Apparently the chief of the "serious practical difficulties" brought forward by the "Horder Committee" is the lack of the necessary apparatus. The apparatus may be lacking, but why should the manufacturers make it when there is no demand for it? The specifications are known, and the assembly is a matter of only a few weeks. The Ministry of Supply has shown what can be done in the way of production when a determined effort is made. Cannot an effort be made now, late as it is, to organize mass radiography of recruits, or must its advocates still submit to the deadening weight of official inertia?—I am, etc.,

London, W.1, Aug. 24. G. T. HEBERT.

Effort Syndrome

SIR,—There is one objection to the form of exercise tolerance test advised by the Horder Committee—namely, the ramshackle condition of the chairs provided for medical boards. Occasionally the method advised has brought about complete collapse of the chair and patient. A safer method was devised to deal with this contingency. The patient sits in the chair and raises himself to the erect position twenty times in thirty seconds. Otherwise the test is the same as the one recommended by the Committee.—I am, etc.,

London, W.1, Aug. 23. J. STEPHEN LEWIS.

A Safe and Simple Tourniquet

SIR,—Dr. Hague in his useful contribution (August 24 p. 266) states that six feet of an elastic bandage is a safe and efficient tourniquet in partially trained hands. It is generally agreed that it is efficient. But is it safe?

Lacking the facile pen of Mr. Hamilton Bailey, I cannot do better than quote from his article in Pye's *Surgical Handicraft*: "A tourniquet must never be left unreleased for more than twenty minutes. If by the end of this time compression is still necessary, the tourniquet should be loosened sufficiently to allow some blood to escape, when it is tightened once again. In this way gangrene may be averted." An elastic bandage is a difficult article to loosen and tighten. It has to be taken off and reapplied, and there is a probability that it will be put on and left on.

Undoubtedly, the best tourniquet for partially trained people and first-aiders is the pneumatic tourniquet, but in the absence of this expensive equipment an excellent substitute is the "improvised" or "stick" tourniquet. This is very easily applied and is readily loosened and tightened. One especially satisfactory form, utilized in practices, is made from a folded triangular bandage with a second bandage used as a pad over the line of the artery.—I am, etc.,

London, W.1, Aug. 24. CLIFFORD EVANS, F.R.C.S.

SIR,—I quite agree with Dr. D. V. Hague's remarks on the dangers of the tourniquet in partially trained hands, and the desirability of having ready something for the purpose safe, cheap, and portable. For years I have used, when vein or artery compression was required, a piece of soft rubber tubing about twenty-four inches long, a quarter of an inch in diameter—in fact, the tubing of a stethoscope will answer. A simple knot of the tubing produces the required pressure and maintains it.—I am, etc.,

London, S.W.1, Aug. 24. REDMOND ROCHE.

Diphtheria Immunization in Evacuated London Children

SIR,—During a diphtheria immunization campaign in East Sussex, described by Dr. W. B. Stott and me in a recent issue of *Public Health*,[1] a number of evacuated London children passed through my hands. We decided to subject each child to a pre-Schick test and one injection of A.P.T. or T.A.F. according to the age of the child, a full course being given to those who were Schick-positive. A number of family groups were found among the evacuated London schools, and the parents of many of these families accepted the offer of immunization. Certain observations recorded during this work may be of interest:

1. Fifty per cent. of the 1,130 London children tested were Schick-negative.

2. Indications of family susceptibility to diphtheria, as revealed by the Schick test (see table). The limitations of the table are obvious. It takes no account of the age factor. It is generally accepted that the Schick-negative state becomes increasingly common as the age of the child advances, and this factor would tend to swell the numbers in the "negative" and particularly the "mixed" columns. Ages were, in fact, recorded at the time of the test, and it may be noted that a number of families owed their inclusion in these two columns to one or more Schick-negative older members. On the other hand, the converse was by no means uncommon. No children previously artificially immunized were included in this table.

Number of Children in Family	Number of Families	All Members Schick-negative	All Members Schick-positive	Mixed	Percentage Homogeneous	Percentage Mixed
2	175	51	70	54	69	31
3	51	19	11	21	59	41
4	16	1	2	13	19	81
5	3	2	1	0	—	—
6	1	0	0	1	—	—

3. Nine pairs of twins were tested. In five, both were Schick-positive; in three, both were negative; and in one, aged 6, one was feebly positive and the other negative.

4. Children in whom the Schick-control injection produced a reaction reacted more or less severely to A.P.T. Two members of the same family showed a pronounced reaction to the control material in the Schick test, together with a still more pronounced reaction to the toxin in the other arm.

5. Several children who reacted strongly to the first injection of A.P.T., among them two Schick-control reactors, also reacted strongly to a subsequent injection of T.A.F. given a month later in the other arm. In our experience any kind of reaction after T.A.F. is very rare.

6. Of fifty-two children who had had an attack of diphtheria one year or more previously, fifteen were Schick-positive and thirty-seven negative. Three were Schick-positive after two attacks of the disease.—I am, etc.,

Haywards Heath, Sussex, Aug. 15. H. LYNDHURST DUKE.

Ether Convulsions

SIR,—Mr. Hamilton Bailey's contribution on ether convulsions (Aug. 17, p. 222) is perhaps on a false scent. It is not the effect of the high theatre temperature upon the ether but upon the feverish, atropinized, mackintosh-covered patient which causes the hyperpyrexial convulsions. These convulsions are classical in type and should be easily separated from the benign ether clonus of light anaesthesia, as they start with one-sided facial twitching, systematically spreading to the rest of the body, and are associated with a dry, burning, cyanosed skin, very high rectal temperature, and deep anaesthesia.

Having seen such benefit from barbiturates in every kind of convulsion I recommended their use in ether convulsions (*British Medical Journal*, 1933, **2**, 1210), and since that time I have never had a failure. This has been endorsed by other writers since that date, and I am glad that the method now has the emphatic endorsement of Mr. Hamilton Bailey as a real life-saving measure no matter how deeply the patient is anaesthetized.

[1] 1940, **53**, 234.

There is no impurity of ether which is a convulsant; it is futile to analyse the ether or compare the fits with those produced by proved convulsants, such as the cocaine group of local anaesthetics, except inasmuch as these fits yield promptly to barbiturates, and it is a wise plan to give an oral barbiturate before any operation requiring free use of novocain or similar drug.

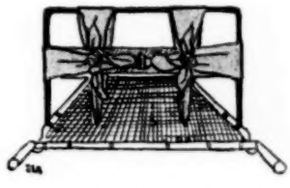
It is regrettable that no record of rectal temperature was taken during the convulsions in Mr. Hamilton Bailey's case, because I think that if this had been done further support for the hyperpyrexial theory would have been obtained. Mr. Hamilton Bailey mentions delayed convulsions due to novocain, and I would like here to mention that these may also occur with ether anaesthesia, and I have had one very severe case fourteen hours after the operation.—I am, etc.,

London, W.1, Aug. 22. A. DICKSON WRIGHT.

Back Rest for A.R.P. Ambulances

SIR,—The necessity for transporting cases in Fowler's position is obvious, yet very few of the "converted" A.R.P. ambulances have any fitting to allow for this. With a stretcher suspension bar (provided for use with a Thomas splint) and three triangular bandages an excellent back rest can be fitted up in a very short time. I enclose a sketch of a back view of the rest.

Instructions.—(1) Bar placed on stretcher frame. (2) Bandages tied on (the ends passing through the stretcher framework can be carried forward to vary the angle). (3) Pillows are placed against the rest. (4) Patient placed on stretcher. (5) Rolled blanket is placed on and tied to the stretcher to act as a "donkey." (6) Patient is placed in ambulance (preferably on one of the top frames). (7) A stretcher strap is put over one end of the vertical frame struts, passed round the patient, and the other end over the opposite strut. The strap is then adjusted to prevent any lateral movement of the patient.



The whole operation takes a very short time, and all the appliances are normal A.R.P. issues. The space taken up is small. This is important, as many of the converted ambulances have all available space filled up by the stretcher frames.—I am, etc.,

Portishead, Aug. 18. J. E. MCCORMICK.

Dye Treatment of Blepharitis

SIR,—While I have found the treatment of blepharitis by dye solution satisfactory in the last two or three years, I have never been sure that this method of treatment is free from danger to the globe. One component, brilliant green, is perfectly safe in the eye, and has been used by Krylov and Rostovtzev in a 0.5% aqueous solution in trachoma as an irrigant. On the other hand, crystal violet, like methyl violet, is a mixture of hexa- and penta-methyl para-rosaniline. This is the dye in copying-ink pencils, and has an evil ophthalmic reputation.

Experimentally, Thompson and co-workers (*Amer. J. Ophthal.*, 1937, **20**, 1087) found that a crystal-violet solution of 0.01% irritated the eyes of animals, while Dr. M. W. Goldblatt of Imperial Chemical Industries, Ltd., tells me in a personal communication that he obtained a really violent keratitis in animals from a 2% solution of crystal violet recommended for ophthalmic irrigation (in a strength of 1%). He had not tried the effect of descending concentrations, however. I have seen several cases in which after application of dye solution to the lid edge the conjunctiva of the lower fornix became very irritable, and two cases in elderly people in which a band of superficial punctate keratitis developed parallel with the margin of the lower lid a week after the initial application. It is interesting, therefore, that Dr. A. T. Elder (August 10, p. 185) finds that dyes can be effectively applied in ointment form, as this will, I feel, be much safer for personal application than the solution in use in many places at present.—I am, etc.,

Leeds, Aug. 21. JOHN FOSTER.

Extra Milk for the Tuberculous

SIR,—I am in entire agreement with Dr. Harley Williams (August 24, p. 268). But not only has the tuberculous individual been left out of the National Milk Scheme; he is ignored by the food rationing system. Local Food Committees have no discretionary powers even to take individual cases into consideration, and I have just been refused permission to grant an extra fat ration to a girl with pulmonary tuberculosis who has recently been confined. Spontaneous hypoglycaemia and tropical sprue, among other conditions, are catered for by the rationing regulations, but a far greater menace is being overlooked by those who control our food supplies.

When this war is over and we begin to look round and build up our new world, tuberculosis is one of the problems that must be solved, not just shelved, and the task will not be made easier if we now allow it to increase, as happened in the last war. There is at present no evidence that the possibility of an increase is being taken seriously, although we are told by our Prime Minister that England must prepare for an offensive in 1941 and 1942, and therefore a long war seems inevitable.—I am, etc.,

F. M. DAY,
London, S.W.13, Aug. 24. M.R.C.S., D.P.H., D.T.M.

Injection Treatment of Muscular Rheumatism

SIR,—I wholeheartedly endorse Mr. Souttar's statement in his letter (August 17, p. 236). I read his short article in the *British Medical Journal* of November 17, 1923, and made a digest of it in my professional scrapbook at the time. I have used the method ever since with the greatest success. I always carry two or three 5 c.cm. ampoules of quinine in my visiting bag, together with a 5 c.cm. syringe and a long fine needle. The injection acts like magic in the majority of acute cases. In chronic cases two or three injections may be necessary to obtain complete relief. Patients with recurring attacks of lumbago come and ask for an injection similar to that which gave relief before.—I am, etc.,

Kingston Hill, Surrey, Aug. 25. E. G. L. GOFFE.

Health and Soil

SIR,—In recent issues of your *Journal* interesting articles and letters have appeared on the important subject of "Health and Soil." In certain quarters there seems to be an impression that both humus and compost possess some special properties beneficially influencing plant life in addition to those depending upon their simple physical and chemical constituton.

It has been suggested that edible products obtained by hydroponic methods of cultivation may prove to be of less nutritional value than like products got by the intervention of humus or of compost; and in this connexion one has to bear in mind that the hydroponic methods of cultivation as at present practised entirely overlook the fact that although land plants and invertebrate animals are independent of any iodine requirement, nevertheless this element in minute quantity is absolutely essential to the life of all vertebrates. That our ordinary foodstuffs are deficient in their iodine content is clearly demonstrated by the widespread prevalence of goitrous conditions in the community at large, visible manifestations of which are, for obvious reasons, frequently observed in women.

When one considers, without any preconceived ideas, the excellent health standards attained by certain human communities in past and in present times on very widely differing diets, none of which conform to modern scientific maxims, it becomes apparent that undue stress is being laid upon the so-called "protective foods" and the various vitamins, and the fact that soils are being gradually but persistently denuded of their iodine content is being overlooked.

In my opinion simple steps taken to prevent goitrous conditions would have very far-reaching effects in the maintenance of the health of man and his domesticated animals, and would ensure that each and every one of us obtained his or her optimum intake of this vital element, as suggested by me in a letter on "the significance of goitre" published in your issue of June 3, 1939.—I am, etc.,

W. MITCHELL STEVENS,
Cardiff, Aug. 23. M.D., F.R.C.P.

SIR,—I have not followed all this correspondence, so you will perhaps forgive me if I repeat arguments already brought forward. Dr. C. Killick Millard (August 17, p. 236) very sensibly proposes that human urine should be conserved and utilized for the fertilization of our kitchen gardens. But the principle seems to me to apply also to all normal human excreta. The present revolution in human affairs which we know as "the war" is bound to end in an almost wholesale return to the land. The necessities of existence, and notably hunger, will dictate that the big cities shall be, if not entirely evacuated, at least greatly attenuated, and the countryside repopulated correspondingly. With the disappearance of the big city's priority in our civilization many of the so-called refinements which have been imposed on us by the exigencies of urban congestion will disappear as well. Among these will be all sorts of elaborate drainage schemes, including the disposal of human ordure. That this material, even in rural districts, should be run through costly artificial channels into rivers or sea instead of being applied to its natural function as manure for the fields is, to say the least, a sad reflection on human intelligence. At this comparatively early stage of the Western revolution not much sympathy will, I fear, be extended to those of us who propose that in all country areas this reform—namely, the direct utilization of human urine and faeces for local manuring—should be put in hand at once. But a little further progress of the war will, I am convinced, satisfy all your readers not only of its practicability but of its inevitability. The risk of a few people catching worms (Dr. H. E. Gibson, August 17, p. 237) will not stop it.—I am, etc.,

Helmsley, Yorks, Aug. 21. A. J. BROCK.

Ship Rats

SIR,—As an old ship surgeon I was very interested in your article on ship rats in the *Journal* of August 24. Rats are scavengers, and every ship has the rats it deserves. The cleaner the ships the fewer the rats. Until ships are built in such a way that every part of the hold is visible, get-at-able, and washable, vermin such as rats, beetles, and cockroaches contaminating our food are bound to thrive.—I am, etc.,

London, W., Aug. 25. GEORGE KAUFMAN.

Potassium in Medicine

SIR,—I would be grateful for the opportunity to reply to some of the important issues brought up in the letter of Dr. Frederick Sutton (August 17, p. 238) in his defence of potassium. Dr. Sutton solves the potassium-in-medicine problem by relying on the empiricisms of generations of doctors and thus makes an unconscious indictment of the value of experimental findings to practical therapeutics. Is there no medical formula that will co-ordinate the best of both these lines of thought and treatment? Would "a line of treatment, whether empiric or scientific, that brings the condition of the blood nearer to its optimal" provide such a desired formula?

To devise such formulae, what is needed is the "humanization," as it were, of medical research. The bringing of medical science from the heights of abstract pure science down to the exigencies of the kitchen: the wedding of pathology and aetiology; of psychology and sociology; of pharmacology and philosophy. Chronic rheumatism, for instance, on the blackboard, in the lecture theatre, in the test-tube, or in the specialist's consulting-room is not the same entity as the living person in his true, environmental, damp-housed, aspirin-saturated, undernourished background.

Now, so far as the potassium question is concerned, may not the many views be synthesized by assuming an individual rhythmic variation in the plasma content of potassium within certain limits, such variation being influenced by dietetic, metabolic, endocrine, etc., factors also present in the plasma? Pathological processes are set up when the potassium concentration falls below or rises above these limits or thresholds. Such extrathreshold conditions begin, in very minute degree, to traumatize the renal or cardiovascular cells, thus preparing the way for the later degenerative diseases. Potassium salts given by doctors may raise a low potassium level into a better level, as in asthma, or may raise a high potassium level, as in renal disease, into a toxic level. Freud has shown successfully that certain adult psychical conditions are related to

psychic trauma in early life. May not certain adult organic diseases be similarly related to chemical trauma in early life?

Finally, if in doubt about the value of pot. cit. give sod. cit.—I am, etc.,

Kearsley, Lancs, Aug. 17. DAVID OCKMAN.

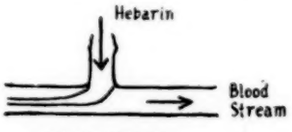
Use of Glass Cannulae in Heparinized Animals

SIR,—Murray and Janes have reported in the issue of the *Journal* for July 6 (p. 6) the use of glass cannulae to join damaged vessels. I have had considerable experience in using cannulae in both cats and dogs under these conditions. I venture, therefore, to add one or two practical pieces of information to their paper.

First, it is very important that the cannulae should be made of pyrex glass. This was discovered both by myself and by Dr. Firor of Hopkins independently. Dr. Firor was enabled to produce a special type Eck's fistula in cats by the use of a cannula without the use of heparin, provided this cannula was of pyrex glass. In my experiments, also, on both the artificial heart and the measurement of blood-flows, which now number many hundreds, clotting troubles practically disappeared after the introduction of pyrex. The cause of this is not understood, but is coupled with the fact that certain types of surface markedly decrease the ability of the blood to clot. Brightly polished copper also has this effect. Platinum, on the other hand, facilitates clotting.

The second point of great importance in the production of local clotting is the velocity of the moving blood. In my artificial heart experiments, where the normal blood of the animal is used and where only from ten to twenty milligrammes of heparin are necessary to prevent clotting in a cat and some twenty-five milligrammes in a small dog, I have never seen clotting in the parts of the apparatus where the blood is moving rapidly. Yet the same blood, if allowed to stagnate in a side-arm, especially on the venous side, may eventually clot during the course of one or two hours. In the same way measurement of slow blood-flows (for example, cat salivary gland) requires many times the amount of heparin in an animal as compared with that of the artificial heart preparation. I see no reason at all why major arteries could not safely be anastomosed for a few hours providing heparin is used. The anastomosis of veins, unless the flow be very rapid, would, however, be more hazardous.

I therefore venture to suggest a still further possibility—namely, the use of the Abel cannula, a sketch of which is attached. I had independently made these cannulae for the



ABEL CANNULA

purpose of measuring slow blood-flows and found them, with care, to be satisfactory. Later on I learned a similar cannula had been previously used by Abel in his plasmophoresis or artificial kidney experiments. These cannulae should also be made of pyrex. The final point is that the cannulae should be scrupulously clean before use. The best way of ensuring this is to keep them preserved in chromic acid solution, washing them off with pure water immediately before use. Needless to say, they require no sterilization under these conditions of storage.

My experience in this type of experiment has been considerable, and as the result of careful attention to these details is uniformly satisfactory. Moreover, where high-velocity blood-flows are encountered, as in a major vessel, the amount of heparin that will be required to prevent clotting of cannulae will be found to be surprisingly small, and it is probably unnecessary to give such amounts as to cause oozing from the operative field. Where heparin is going to be administered by an injection apparatus, which presupposes more competent hospital facilities, the Abel type cannulae would appear to be desirable.—I am, etc.,

O. S. GIBBS, M.B., Ch.B.,
Chief, Division of Pharmacology,
University of Tennessee Medical School.

Memphis, Tennessee, July 29.

Obituary

JOHN GERALD FITZGERALD, M.D., LL.D.

On June 20 Dr. John Gerald FitzGerald, director of the Connaught Laboratories and of the School of Hygiene, University of Toronto, died in his fifty-eighth year. Dr. FitzGerald was internationally known as an authority on medical education, as a leader in preventive medicine, as a scientific investigator, and as a director of medical research. As a result of his vision, initiative, and leadership there were established in the University of Toronto the Connaught Laboratories and the School of Hygiene. Returning to his alma mater in 1913 as associate professor of hygiene and preventive medicine, University of Toronto, he devoted himself to an endeavour to create, within this university, a non-commercial scientific institute to fulfil two functions in the interests of medical public service—namely, research in the field of preventive medicine, and the preparation of diphtheria antitoxin and certain other biological products so that these products might be supplied throughout Canada in such a fashion as would ensure their being of high quality and low price. His insistent perseverance soon yielded success in this endeavour, and the antitoxin laboratory which he established at that time, and which shortly became known as the Connaught Laboratories, later proved to be a major contributing factor in the establishment of a national School of Hygiene at the University of Toronto. The achievements of these two institutes—the Connaught Laboratories and the School of Hygiene—are due in no small measure to Dr. FitzGerald's constant encouragement and promotion of intimate relationships and integration among teaching, research, and public service activities.

Serving as a member of the International Health Board of the Rockefeller Foundation from 1923 to 1931, subsequently as a scientific director of the foundation's International Health Division, and as a member of the Health Committee of the League of Nations from 1930 to 1936, Dr. FitzGerald evidenced his keen interest in international public health. In 1933-4 he joined General F. F. Russell and Sir Wilson Jameson in making, for the International Health Division of the Rockefeller Foundation, a survey of health conditions in India, Ceylon, and Egypt. In 1936-7, at the instance of the Division of Medical Sciences of the Rockefeller Foundation and in company with Dr. C. E. Smith, he undertook a survey of the teaching of preventive medicine to medical undergraduates in Europe and North America. For four years, 1932-6, he served as dean of the Faculty of Medicine, University of Toronto.

He gave generously of his time to various important administrative and research undertakings in Canada—the Dominion Council of Health, of which he was one of the original members, the National Research Council of Canada, the Ontario Research Foundation, and the Banting Research Foundation—and to various professional societies, including the Canadian Medical Association, the Canadian National Committee for Mental Hygiene, and the Canadian Public Health Association. He was elected a fellow of the Royal Society of Canada in 1920 and was honoured by Queen's University with the degree of LL.D. in 1925. He was one of the Charter Fellows of the Royal College of Physicians and Surgeons of Canada. He made many contributions to scientific literature. To meet the needs of medical students he early published a *Laboratory Guide in Bacteriology* and later *An Introduction to the Practice of Preventive Medicine*, an extensively used textbook.

Within and far beyond the institutes to which John Gerald FitzGerald devoted his life his work will continue to live, and he will be remembered as one who contributed richly to the advancement of public health throughout the world.

R. D. DEFRIES.

EDWARD P. FURBER, C.B.E., M.R.C.S.

It is with great regret that we announce the death of Edward Price Furber at his home in Welbeck Street, London, at the age of 75.

His father married twice and Furber was the eldest of the second eleven of twenty-two children, nineteen of whom were sons. He went to Charterhouse School soon after its arrival at Godalming from London and entered the Medical School of St. Bartholomew's Hospital in 1881. He spent his first two years as a student enjoying himself, joining in all sorts of games. He then settled down to work and eventually took the M.R.C.S. and L.R.C.P. in 1888. After qualification he held a resident post at the North-West London Hospital (Hampstead General) and acquired at that institution a taste for anaesthetics, in the administration of which he eventually became an expert. He then began general practice at Oxted, Surrey, as a partner to Dr. Oldham of Bletchingley. He at once became popular among the hunting folk and farmers, into whose exploits he entered with the fullest of zest and about whom he had many stories to tell. His practice became so large that he thought life would be more lucrative if he came to London, to which he migrated in 1910. This, however, gave him no relief, as many of his patients followed him, and he at once built up an enormous practice among all grades of society in the West End. He was dearly loved by the theatrical profession. Soon after his arrival in London he became an anaesthetist to St. Luke's Hospital for the Clergy, which brought him in contact with many surgeons who appreciated his admirable qualities as an anaesthetist.

Furber was never idle. When his practice permitted, he was constantly attempting to increase his knowledge by attending lectures at medical societies and paying regular visits to the spas of Germany, Czecho-Slovakia, and France, usually with a party of friends who delighted in his company. He was a Fellow of the Medical Society of London and of the Royal Society of Medicine and a Vice-President of the Chelsea Clinical Society. During the last war he was very active. He became the medical officer in charge of Miss McCaul's Military Hospital in Welbeck Street and also of the Mackinnon Hospital for Wounded Officers in Queen's Gate Terrace, which posts he held throughout the war. In addition, he was anaesthetist to the West End Hospital for Nervous Diseases and the No. 3 General Military Hospital at Wandsworth. For his services he was awarded the C.B.E. He was also obstetric physician to the Lady Howard de Walden Maternity Hospital. In 1930 he became the honorary medical superintendent to St. Luke's Hospital for Advanced Cases in Hereford Road, Bayswater. No more suitable officer could have been appointed. His great cheerfulness was an ideal quality for the patients in that institution.

Furber was a great character, magnificent in presence, full of charm, kindly in spirit and, withal, a first-class doctor. He was a keen Freemason and his loss will be severely felt among the very large number of his friends in that fraternity. It is sad that for the last year of his life he was bedridden. Here, however, he exhibited great courage, for he set himself the task of writing a book of his reminiscences, *London Doctor*. His character is written in this book, which is an excellent guide to young practitioners seeking to make a successful career. The volume had a warm reception, which gave him much pleasure and helped to lighten his sufferings. A host of friends mourn his passing.

An old friend writes:

As those are aware who have read his very frank and amusing reminiscences, published not long ago under the title of *London Doctor*, Furber began practice in Surrey and soon built up a large connexion in what was forty years ago a rural but is now almost a suburban district. He had, on his own showing, thoroughly enjoyed himself in a rather rollicking fashion during his student days at St. Bartholomew's Hospital, and had achieved no particular academic distinction in the examination halls. But he had sure passports to success in a profound knowledge of human nature, an intuitive gift for handling many and various types of patient, and a sincere and evident desire to be as helpful as possible in every way to those who sought his advice: to put it shortly, he had an admirable bedside manner as well as a large fund of common sense. After several years he moved to London, where his Surrey patients spread his fame to such purpose that he soon obtained a large clientele. He had a most infectious chuckle, was always cheerful, and could infuse something of his own good spirits into depressed and ailing patients. With stage celebrities he was always very popular: his unfailing fund of anecdote, both Rabelaisian and other, no doubt helped him with stars of comedy and drama. Edward Furber, in short, had personality: there was no one in general practice in London quite like him at the height of his success—say the nineteen-twenties—and his passing leaves a gap in Welbeck Street which many colleagues as well as patients will deeply regret.

C. G. A. CHISLETT, M.B., F.R.F.P.S.

Dr. Charles G. A. Chislett died on August 24 after an illness of a few months' duration which necessitated operative treatment. He was in his fifty-seventh year and was born in Lanark, educated at St. Mungo's College, Glasgow, and Edinburgh and Glasgow Universities.

After graduating M.B., Ch.B. of Glasgow University in 1906 he became a house-surgeon in Glasgow Royal Infirmary and then began his institutional career as a junior physician in Woodilee Mental Hospital, Lenzie, where he ultimately became pathologist and senior assistant. In 1914 he was appointed medical superintendent to Stoneyetts Institution for Mental Defectives under the Glasgow District Board of Control. In 1915 he joined the R.A.M.C., and served with the Forces at home and over-seas until he was demobilized in 1918. He was invalided home from Salonika in 1916. On his recovery he proceeded to France, where his work was chiefly pyschiatry. On demobilization he returned to Stoneyetts, and he remained there until Lennox Castle, Stirlingshire (a very large institution replacing Stoneyetts) was opened in 1936, where he was superintendent until his death. Dr. Chislett was the author of *Notes on Mental Deficiency*; "Syphilis and Congenital Mental Defect" (*J. ment. Sci.*, 1911); "Effect of Factors producing Shell Shock" (*Glasg. med. J.*, 1921); "Case of Acute Spinal Abscess" (*J. R.A.M.C.*, 1921). Though he was of a most retiring and unassuming disposition, almost to the point of shyness, he took a keen interest in the British Legion, and had been an active member of the B.M.A. since 1923. In his younger days he was a good footballer, cricketer, and golfer; he continued to play golf well until his illness.

It is with sorrow that I write the above on behalf of myself and the many friends, both medical and other, whom he made during his Army, institutional, and social career. I do so because it was my privilege to be a friend of his for forty-six years. He will be missed very much by his friends and the staff and patients of his institution. He is survived by his wife.

J. G. McC.

ANNIE GREENEP, M.B., D.P.H.

Dr. Annie Carr Greenep of Sheffield died suddenly on August 15 at the age of 52. She graduated at Edinburgh in 1910, and took the D.P.H. diploma of Manchester University in 1913. For many years she had been an assistant medical officer in the school medical service at Sheffield, and for several months acted as the principal medical officer of that service during the illness of the late Dr. Chetwood some years ago. The funeral service on August 19 at the Sheffield Crematorium was attended by Mr. A. W. Fawcett (chairman of the Sheffield Division of the B.M.A.), Dr. J. Rennie (M.O.H. for Sheffield), and other members of the Executive Committee of the local B.M.A. Division. Dr. Greenep had been for many years a valued and regular member of that executive committee, and the following tribute to her memory is contributed by one who was for many years one of her colleagues on that body.

The passing of Dr. Annie Greenep of Sheffield has removed from the ranks of the profession one of the gentlest and most winning personalities that it has been our privilege to know. Such a nature as hers found a congenial sphere of

work in the school medical service, in which for many years she rendered loyal service. Her efficiency in her professional work was conspicuous to those in touch with it. Yet she herself seemed always to have the feeling that it should have been better done. Three years ago she suffered from a subarachnoid cerebral haemorrhage, which necessitated absence from work for many months. Although recovery followed, so that she was able to resume her professional work, she was never quite the same after this attack. The sense of imperfection in her work, which had always been present, became aggravated as the result of her illness. One who was herself the personification of unselfish helpfulness could not bear the thought of becoming a burden to her fellows. To a gentle and sympathetic nature such as hers the atrocities and sufferings inflicted by the war on so many others must have been especially painful to witness. And it may well be that this was the added factor which finally disturbed the balance of her mind so far as to lead her to seek the way of escape which she chose. Even to this tragic ending she has given a pathetic and beautiful touch: for the letter which she, who had helped so many others, left behind as her last message concludes with the grateful expression of her own indebtedness to her many friends. Sheffield is the poorer for her loss.

H. C.

The death of Mr. BERNARD A. MAKEN at the age of 29 occurred when he was on the threshold of a promising orthopaedic career. Qualifying M.B., Ch.B. in Capetown, Maken came to this country to obtain higher qualifications. After holding various resident appointments he proceeded to the M.Ch.Orth. of Liverpool in 1937. While studying for a fellowship in surgery he became aware of the illness which was to lead to his death and, having realized its seriousness, he devoted his life to active orthopaedic practice. Since the outbreak of war he held the posts of resident surgical officer at Leasowe Hospital and visiting orthopaedic surgeon at Mill Road Infirmary. The normal holders of these posts were absent on military service. Maken was disappointed to find that he was medically unfit for the Army, but he continued to practise his specialty until a few weeks ago. A colleague writes: Maken's death has brought sorrow to his many friends. He will be remembered as an able and conscientious surgeon, who appeared certain to have a successful career in orthopaedic surgery. He had a cheery and live personality which brought him many friends on Merseyside. All who knew him were profoundly impressed by the manner in which he bore his own infirmity and by the skill and devotion with which he continued his work as long as his strength would permit. Their deep sympathy is extended to his parents and their family in Capetown.

Dr. THOMAS STEWART SLESSOR, who died recently in Inverness with tragic suddenness in his sixty-third year, was the son of the Rev. Robert Slessor of Methlick. He was educated at the Aberdeen Grammar School and Aberdeen University. He graduated M.A. in 1898, and M.B., Ch.B. in 1902. While a student he was an active member of the Aberdeen University Company of the Volunteer Medical Corps. After graduation he was assistant surgeon at Aberdeen Royal Infirmary for a year, and later was in practice in Seaham Harbour and Glamis. Dr. Slessor served in the Army throughout the last war, and saw service both at home and over-seas. He was mentioned in dispatches. In 1920 he was appointed Deputy Commissioner of Military Services in the Ministry of Pensions. In 1928 he went to Inverness to join Dr. L. M. V. Mitchell as a partner in his practice. The part of his work which attracted Dr. Slessor most was midwifery. He was recognized by his colleagues as a skilful and successful obstetrician. His cheerfulness and enthusiasm were infectious, and will be much missed. Always keen on exercise, he invariably walked for an hour each day; if he was too busy to get to the country he would do part of his rounds on foot; it was no uncommon sight to see his tall upright figure stepping out briskly. He leaves a grown-up son and daughter by his first wife, who predeceased him a few years ago. Only five weeks before his death he had married Miss Babs Luke, the elder daughter of the late Mr. James Luke, a well-known Inverness surgeon. Dr. Slessor's son is a member of the medical profession, and is at present a surgical registrar in Aberdeen Royal Infirmary.

Universities and Colleges

UNIVERSITY OF ABERDEEN

The University Court has appointed James Norman Davidson, M.D.Ed., to the Lectureship in Biochemistry.

UNIVERSITY OF GLASGOW

Dr. James Macalister Mackintosh, chief medical officer to the Department of Health for Scotland, has been appointed to the Chair of Public Health at the University of Glasgow.

The Services

CASUALTIES IN THE MEDICAL SERVICES

ROYAL ARMY MEDICAL CORPS

The name of Captain NIEL SURGEY ROBINSON, R.A.M.C., is included in an Army Council list of casualties published on July 29 as "Missing, Believed Killed." He was educated at the University of Birmingham, where he graduated M.B., Ch.B. in 1925. After holding the posts of casualty house-surgeon, house-physician, and gynaecological and obstetric house-surgeon at the Birmingham General Hospital he settled in practice at Langley Green, near Birmingham. For a time he was honorary consulting anaesthetist to the Nuneaton General Hospital. At the outbreak of the present war he was holding a commission as lieutenant in the R.A.M.C., T.A., attached to the 8th Battalion of the Warwickshire Regiment, and was immediately called up for service.

Captain JOHN WALTER SMITH, R.A.M.C., has died from war operations. He was the elder son of Dr. F. W. W. Smith, and qualified M.R.C.S., L.R.C.P. in 1938.

Missing

Major Christopher Rowland Alderson, M.C., R.A.M.C.

Prisoners of War

Lieutenant George Frederick Arthur Caldwell, R.A.M.C.
Lieutenant Deryk Taverner, R.A.M.C.

ROYAL AIR FORCE MEDICAL SERVICE

Flight Lieut. ROBERT STEVENSON CROMIE, R.A.F.M.S., has been killed by enemy action. He graduated M.B., B.Ch., B.A.O. at Queen's University, Belfast, in 1931, proceeding M.D. in 1937. He also took the M.M.S.A. in 1938. After holding house appointments at the Ulster Hospital and the Maternity Hospital, Belfast, he settled in practice at Coulsdon. He was an honorary medical officer of the British Red Cross Society, and at the outbreak of war was a flying officer in the Auxiliary Air Force.

DEATHS IN THE SERVICES

Surgeon Captain ROBERT FORBES BOWIE, C.B., R.N. (ret.), died at Anerley on August 10, aged 79. He was born on September 20, 1860, was educated at University College Hospital, and took the M.R.C.S., L.R.C.P. in 1885. Entering the Royal Navy soon afterwards, he became fleet surgeon on February 16, 1901, and surgeon captain on May 7, 1905. While serving as staff surgeon in H.M.S. *Tauranga* he landed with a naval party in Samoa in 1899 and was mentioned in dispatches. He subsequently landed with a naval brigade during the South African War, receiving the Queen's medal. He served in the war of 1914–18 and was present at the Battle of Jutland, when he was mentioned in dispatches and received the C.B.

J. Champeix (*Thèse de Paris*, 1940, No. 340) records three cases of Korsakoff's syndrome in women aged 40, 41, and 53, the subjects of chronic alcoholism, who all showed considerable improvement as the result of subcutaneous injection daily of 10 mg. of vitamin B_1 in the form of tablets and 1 gramme of hepatic extract. In two cases walking became possible in spite of considerable amyotrophy, and in all three cases the sensory troubles disappeared although the tendon reflexes were still lost. The mental condition was but little affected by subcutaneous injection, but was slightly improved by intrathecal injection of vitamin B_1.

EPIDEMIOLOGICAL NOTES

Enteric Fever

In England and Wales enteric fever has increased in incidence by as much as 50% on the number in the previous week.

In the first seven months of this year 1,349 cases of enteric fever were notified in England and Wales, compared with 666 in the corresponding period of 1939; a greater proportion than usual of the cases were of paratyphoid B fever, in which the disease runs a relatively mild course and the case mortality is low. This is borne out by the figures of the deaths in the 126 great towns during this period, which were 24 in 1940 against 31 in 1939. The total of 195 cases for the whole country were distributed among twenty-nine of the sixty-one administrative health areas, but only in six were there more than 5 during the week: Northampton 57 (Northampton 1, Kettering 19, Higham Ferrers M.B. 1, urban districts of Burton Latimer 2, Corby 11, Desborough 4, Rothwell 2, Rushden 4, Wellingborough 8, and rural district of Kettering 5); Warwick 23 (Birmingham 12, Coventry 1, Kenilworth U.D. 1, Solihull U.D. 4, Sutton Coldfield M.B. 3, Stratford-on-Avon R.D. 1, Warwick R.D. 1); Lancaster 21 (Blackpool, Bolton, Burnley, 2 each, Liverpool 1, Manchester 4, Preston 1, and 1 each in nine municipal boroughs and urban and rural districts); Devon 21 (Exeter 14, Newton Abbot U.D. 3, Torquay M.B. 1, St. Thomas R.D. 3); London 13 (2 each in Hackney, Wandsworth, and Poplar, and 1 each in Camberwell, Fulham, Paddington, St. Pancras, Shoreditch, Westminster, and Woolwich); Surrey 8 (Dorking U.D. 2, Wimbledon M.B. 4, Dorking and Horley R.D. 1, Hambledon R.D. 1); Yorks, East Riding, 6 (Hull 5, Haltemprice U.D. 1). In Scotland, where differentiation is made of the three enteric fevers, there was one case of typhoid fever in Greenock and one of paratyphoid A in Glasgow. The 13 cases of paratyphoid B fever occurred in the counties of Aberdeen 3, Argyll 3, Dumbarton 1, Lanark 1, and in the burghs of Glasgow 2, Dundee 1, Edinburgh 1, Port Glasgow 1.

Cerebrospinal Fever

Although the incidence of cerebrospinal fever was lower than that of enteric fever it remains more widely distributed, involving thirty-two administrative areas, and in seven more than 5 cases were notified: Yorks, West Riding, 19 (Bradford 2, Dewsbury 1, Leeds 3, Rotherham 2, Sheffield 7, and 1 distributed in each of four urban and rural districts); Lancaster 18 (Barrow-in-Furness 1, Bolton 1, Liverpool 7, Manchester 1, Preston 1, Rochdale 1, Lancaster M.B. 2, and 1 each in the municipal boroughs of Haslingden and Middleton, and in the urban districts of Litherland and Urmston); London 18, with 2 deaths (Westminster 4, Kensington, Lambeth, and Wandsworth 2 each, and 1 each in Battersea, Fulham, Hammersmith, Lewisham, Paddington, St. Marylebone, St. Pancras, and Shoreditch); Glamorgan 10 (Cardiff 2, Merthyr Tydfil 1, Swansea 1, Barry M.B. 1, Aberdare U.D. 1, Pontypridd U.D. 1, Rhondda U.D. 3); Kent 6, Gloucester 6, Yorks, East Riding 6. The 44 cases notified in Scotland were distributed among ten counties (Ayr 3, Inverness 2, Lanark 2, and 1 each in Caithness, Dumfries, East Lothian, Midlothian, Orkney, Renfrew, and Sutherland) and six burghs (Glasgow 12, with 1 death, Edinburgh 9, Paisley 3, and 2 each in Aberdeen, Dundee, and Inverness).

Acute Poliomyelitis

Twelve areas contributed to the total of 24 cases, and only in four were more than 2 notified: Yorks, West Riding, 5 (Leeds 1, Harrogate 3, Knaresborough U.D. 1); Lancaster 4 (1 each in the county borough of Blackburn and in the urban districts of Formby, Hindley, and Prescot); Durham 3 (South Shields 2, Bishop Auckland U.D. 1); Glamorgan, 3 in Cardiff. Other counties recording cases were: 2 in Petworth R.D. (Sussex) and 1 each in Ampthill R.D. (Bedford); Wigton R.D. (Cumberland); Lambeth, Stafford M.B., Birmingham, Dudley; and Masham R.D. in the North Riding of Yorks. The notifications are well below the figure—81—for the corresponding week of the epidemic year 1938. The 4 Scottish cases occurred in the counties of Dumbarton and East Lothian, and in the burghs of Aberdeen and Kilmarnock.

No. 32

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended August 10, 1940.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1940					1939 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	141	18	44		2	21	1	3		1
Deaths		2	1				—	—		
Diphtheria	817	26	296	47	30	720	77	176	23	18
Deaths	23	—	6	—	—	14	4	2	1	1
Dysentery	45	1	42		—	37	8	21		—
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	3	—	—		—	3	—	—		—
Deaths		—	1				—	—		
Enteric (typhoid and paratyphoid) fever	195	13	16	4	1	32	1	9	4	1
Deaths	7	—	—	—	—	—	—	1	—	—
Erysipelas		21	44	7	4		—	42	7	3
Deaths		—	—				—	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	31	4	10	9	12	27	5	7	9	3
Measles*	9,048	51	518		18		20	44		1
Deaths	6	—	7	—	—	3	—	—	1	—
Ophthalmia neonatorum	104	11	11	3	—	88	10	21	—	—
Deaths										
Pneumonia, influenzal†	435	14	4	1	7	317	17	2	—	5
Deaths (from influenza)	6	—	2	—	—	8	1	—	—	—
Pneumonia, primary			133	9				99	6	
Deaths‡		13		4	4		9		6	4
Polio-encephalitis, acute	2	1				3	—			
Deaths		—					—			
Poliomyelitis, acute	24	1	4		—	15	4	1		2
Deaths		—	—				—	—		
Puerperal fever	8	8	8	—	—	6	6	14	1	—
Deaths		—					2§			
Puerperal pyrexia	165	10	7		1	169	18	12		—
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,275	38	133	35	39	1,320	108	202	32	55
Deaths	—	—	—	—	1	3	—	—	—	1
Small-pox	—	—	—		—	—	—	—		—
Deaths	—	—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	1	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough*	828	14	44		16		174	39		9
Deaths	3	1	—	—	5	11	3	—	2	—
Deaths (0-1 year)	265	29	44	21	24	227	35	48	32	21
Infant mortality rate (per 1,000 live births)						36	32			
Deaths (excluding stillbirths)	3,915	677	566	138	116	3,591	667	558	164	138
Annual death rate (per 1,000 persons living)			11.4	9.2	10.2	8.8	8.6	11.3	11.0	12.1
Live births	5,647	875	823	333	212	5,764	973	914	318	221
Annual rate per 1,000 persons living			16.6	22.2	18.6	14.1	12.5	18.5	21.4	19.4
Stillbirths	228	29	32			205	40	46		
Rate per 1,000 total births (including stillborn)						35	33			

* Made notifiable generally on November 1, 1939.

† Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

‡ Since January 1, 1940, figures for London (b) have been for deaths from all forms of pneumonia; the corresponding figures for 1939 relate to deaths from lobar pneumonia only.

§ Deaths from puerperal sepsis.

Medical Notes in Parliament

The Finance (No. 2) Act received the Royal Assent on August 22. Parliament adjourned that day till September 5.

Mr. Eden met on August 22 representatives of the Conservative Party's Health and Housing Committee and of the Army Committee to discuss the provision of body armour and visors for soldiers. He said the former had been considered for some time. The difficulty was to provide armour which was both light and efficient. Five thousand visors of the type designed by Sir Richard Cruise had been ordered, and would be compared with another type which was also under test.

In a statement to the House of Commons on August 22 Sir John Anderson, Minister of Home Security, said that to have the sirens sounded in all the towns in the course of an enemy aircraft which were within bombing range would mean unnecessary interruption of industry and transport and undue interference with the ordinary activities of the public. Public warnings must be limited to the districts thought likely to be selected for attack. There could be no guarantee that every area would always be warned before the raid developed. He felt sure the people of this country were ready to take this risk.

The Ministry of Home Security is investigating a claim by Dr. Gerard Savoy of Lausanne that he has produced an efficient antidote to mustard gas.

Physical Training for Youth

Mr. Ramsbotham, President of the Board of Education, announced in the House of Commons on August 22 the formation of a directorate to secure the further development of physical training for young people in the 14–18 age group. He said: The House will be aware of the great and growing desire among the young people of this country for further opportunities of physical training and recreation to enable them to attain a higher standard of bodily fitness and to make a fuller contribution to the service of their country. I have for some time been considering this important matter, and have decided to set up a small directorate to secure the further development of physical training and recreative work among young people of both sexes. The directorate will work in close association with the youth branch of the Board of Education and in co-operation with the War Office, the Board being concerned mainly with young people between the ages of 14 and 18. The Secretary of State for War is appointing an officer to act in liaison with the Board of Education. I wish to make it clear that this decision involves no departure from the policy of co-operation with local education authorities and voluntary bodies. We have no intention of ignoring the wider interests of youth or of creating a new movement based exclusively on physical training; our object will be to strengthen the service of youth on the physical training side, where it is at present most severely handicapped. The new directorate will have as one of its immediate tasks to examine the best methods of appealing to young people, including, for example, the question of some form of county badge. It will also set itself to provide all possible facilities for the satisfaction of the growing desire among young people to get and keep themselves fit, and so to be of greater service to their country in the present crisis of its existence. The House will understand that no movement of this kind can succeed unless it has the full support of local education authorities and voluntary organizations. I have already had some preliminary discussion on the matter with the executive of the National Youth Committee, which includes representatives of local authorities and voluntary bodies, who have cordially welcomed my proposals, and I shall proceed forthwith to more formal consultations.

Medical Care in Internment Camps

Answering Lord Davies on August 22, the Duke of Devonshire said there had not been time to carry out a comprehensive review of medical arrangements for the care and treatment of internees in the camps, but it was not true that medical arrangements were totally inadequate. Inquiries showed that, while in two temporary camps the position was far from satisfactory, the arrangements in the more permanent ones in the Isle of Man were reasonably good. The two temporary camps, both tented, were at Sutton Coldfield and Prees Heath. In the other camps hospitals were available where internees could receive medical attention. Serious cases of illness which could not be treated in them were sent to civilian hospitals, where the internees received the same treatment as other patients. There were still in the camps some old and infirm persons who might be eligible for release under the terms of the White Paper. The importance of early release in these cases was recognized, and special steps were being taken to secure for medical officers in charge of camps additional assistance.

Medical Care of Home Guard

On August 20 Sir Francis Fremantle asked the Secretary of State for War what arrangement had now been made with the civil medical profession through the Central Medical War Committee to provide medical care for the Home Guard when on duty. Mr. Eden: I am glad to have this opportunity of expressing my gratitude for the very generous offer received from the Central Medical War Committee. The committee has been asked to communicate, through its local organization, with each of the Territorial Army Associations in order to make suitable arrangements in each area, and the Associations have been asked to take full advantage of the committee's suggestion.

[Details of the offer made by the Central Medical War Committee are published in the *Supplement* this week at p. 19.]

Blood Transfusion Resources.—The Minister of Health states that the demand for blood transfusion for the emergency medical services is so far well within the ordinary resources of hospitals, supplemented by the special organization set up in the London area and by the schemes for the production of plasma which are being established in the several regions. These arrangements should be adequate. Supplies of blood from over-seas are not necessary.

Medical News

American ambulance No. 1, with which the wife of the American Ambassador inaugurated the American Ambulance for Great Britain last June, is to be presented to the Borough of Windsor on Sunday next.

The Section of Neurology and Psychiatry of the New South Wales Branch of the British Medical Association has arranged a symposium in three parts on the cerebellum and its diseases. The first meeting was held on June 20, the second on July 22, and at the third (on September 19) Dr. S. M. Morson will discuss the diagnosis of cerebellar disease, Dr. Douglas Miller the surgery of extracerebellar tumours, and Dr. Gilbert Phillips the surgery of intracerebellar tumours.

The *South African Medical Journal* of July 27 publishes an analysis of the new edition of the *Medical Register* for the Union of South Africa. At the end of 1939, after allowing for duplications, there were 3,259 names on the register, an increase of 171 over the total for the previous year. In 1913 the names numbered 1,346; in 1923, 1,791; and in 1933, 2,478.

During the last two weeks thirty-five new "Fitness for Service" Centres have been opened, making the total number now in operation throughout the country 210. The attendance at these centres, where youths and men are doing their utmost to get and keep themselves fit to serve their country, whether in civil defence, employed in an essential industry, or waiting to be called to the Forces, is remaining consistently good in spite of the fact that many men are called up every week. The Central Council of Recreative Physical Training (58, Victoria Street, S.W.1), which is responsible for the scheme, is working in close conjunction with the Board of Education and the recently formed Directorate of Recreative Physical Training.

By the end of last week the Lord Mayor's Red Cross and St. John Fund for the Sick and Wounded in the War had passed the total of £2,662,000.

Readers of the *Journal* are reminded that changes of address should be sent to the Accountant of the British Medical Association and advertisements to the Advertisement Manager, and *not* to the Editor.

Letters, Notes, and Answers

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QUERIES AND ANSWERS

Defect of Micturition

"PUZZLED" would be glad if any readers could suggest treatment for a man of 37 who finds himself unable to express the last few drops of urine at the end of micturition, and consequently finds himself constantly staining his clothing—duration over a year, no other symptoms or physical signs. Bromides and alkalis alleviate but do not cure this distressing condition.

"Only Functional"

Dr. HUGH H. CARLETON (Clifton, Bristol) writes: In your issue of August 17 under "Queries and Answers" a correspondent asks for advice with regard to unpleasant and distressing heart attacks. It appears to me that he is describing a typical vasovagal syndrome, originally termed by Gowers "vagal epilepsy." While the symptoms vary from case to case, there is a general similarity in the clinical pictures. In the case of your correspondent the symptoms are essentially respiratory and cardiac. With some people the attacks start as an abdominal sensation, gradually spreading to the thorax. An outstanding feature of such cases is that there is no loss of consciousness. The subjective sensations are terrifying and the patient often experiences a feeling of impending death. Treatment consists in the administration of luminal or bromides. Apart from the dread of attacks the patient comes to no harm. Further, I have never seen sufferers from the condition develop ordinary epilepsy.

Lieut.-Colonel EDWARD GOWLLAND writes: I was interested in a communication headed "Only Functional" (August 17, p. 244). I have a case of a lady who has been under my care for many years who also suffers from the distressing heart attacks which occur, as your correspondent records, without the slightest cause, sometimes even when sitting quietly, writing letters, etc. This lady also gets very severe migraine with the classical symptoms of hemianopia, followed by bright flashes of light with zig-zag patterns, then severe headache and nausea, frequently terminating in vomiting. Some years before these attacks of migraine my patient began to have, and still occasionally has, most distressing attacks of paroxysmal tachycardia, which she has been told by eminent heart specialists are really of no consequence, but they are terrifying and "knock her out for the time being." The duration of these attacks varies from ten minutes to twelve hours—the average length being about two hours. The attacks of migraine and tachycardia have never in this case coincided or overlapped. Various forms of treatment have been exploited for both these conditions. For the tachycardia I know of nothing to cut it short. If such attacks are prolonged they nearly always terminate with vomiting. Once or twice I have given my patient an emetic, which, if it has acted, has apparently shortened the attack. After many experiments we have come to the conclusion that "veganin," taken immediately the first symptoms of migraine appear, is of definite value: the dose which has been given is two tablets. I have therefore instructed my patient never to go about at any time without a supply of these tablets, as on several occasions when she has been without them the attack has been much prolonged.

Dr. PAUL M. ASHMORE (Harrogate) writes: In reply to "Only Functional," it seems that although there may be a functional element present there is the possibility of a disturbance of calcium metabolism with an accompanying spastic element, or one might say an instability of the sympathetic and parasympathetic nervous systems. This would account for all the symptoms observed. Working on this theory a doctor to whom I was assistant stated that by careful observation it was possible to differentiate two classes: the "sympatheticotonics" and the "parasympatheticotonics." The patients were given bromides and calcium in the form of syr. calcii lactophos. Our results were good. We found that calcium in the form of this syrup was the preparation which produced the best results, given in drachm doses over prolonged periods.

Income Tax

Dissolved Partnership

With further reference to the reply to A., B., and C. in our issue of August 10: As the partnership was dissolved as from June 30, 1940, the assessment for 1940–1 will have to be reduced to the amount of the profits for the period from April 5, 1940, to June 30, 1940. The usual method of determining the amount applicable to such a period is to prepare an account for the period as from the end of the last yearly account (that is, for the six months to June 30, 1940) and take a proportion for the period required—say one-half in this case. The other half added to three-quarters of the 1940 profit will give the amount applicable to the financial year ending April 5, 1940. The "option" referred to in the previous reply relates to the second and third years after the commencement of a new practice. The liability of the first year is, of course, assessed on the actual profits of that year; that for the second year on the profits of the first twelve months; and that of the third and subsequent years on the preceding year's profits. But at the option of the taxpayer *both* (not one or the other) of the second and third years' assessments can be adjusted to the amount of the profits of those actual years.

LETTERS, NOTES, ETC.

School Medical Service

The need for maintaining as complete a School Medical Service as possible is emphasized in a memorandum just issued by the Board of Education to local education authorities. It is recognized that difficulties have arisen and will continue to arise from such causes as the transfer of doctors to the Services and the increased child population in reception areas. Local authorities are asked to make every effort to fill vacancies in their school medical services, but if replacement is impracticable neighbouring authorities should consider the possibility of a temporary pooling of their staffs. The memorandum sets out the minimum service which should be provided in every area: (1) Each child should receive a full medical examination as soon as practicable after admission to school. (2) Every school should be frequently visited—if possible at least once a term—by a medical officer for a rapid survey of all the children, particular attention being paid to ailing children and to nutrition and the selection of those who need supplementary nourishment; nutrition of the school child is a branch of the work of the school medical service which should be maintained and, so far as practicable, extended. (3) The work of detecting and preventing uncleanliness should be continued as before. (4) All children requiring observation or treatment should be followed up and existing treatment facilities maintained. The memorandum deals similarly with dental inspection and treatment under the School Dental Service.

Maternity Hospital for Officers' Wives

A note in the *Journal* of March 16 (p. 456) announced that the Maternity Hospital for the Wives of Officers in the Royal Navy, the Army, and the Royal Air Force, situated at Fulmer Chase, Slough, Bucks, was open for the admission of patients. This valuable wartime institution has now been able to increase its accommodation by securing beds for about half a dozen ante-natal cases, thus releasing beds in the hospital for those needing more urgent attention. The new beds are in a country house near Fulmer Chase. Applications for admission to the hospital should be sent to the Hon. Secretary, Maternity Hospital for the Wives of Officers, 60, Portland Place, London, W.1. The inclusive weekly charge is four guineas, and there is a small fund to help those who are unable to meet this charge; a few single rooms are available at higher rates.

American Hospitality for British Doctors' Children

The United States Committee for the Care of Children has offered to provide hospitality for doctors' children between the ages of 5 and 15, who would have to go unaccompanied by parents. It is probable that it could be arranged for American doctors to take British doctors' children into their homes, in the selection of which the greatest care is taken. The corresponding organization in London—the American Committee for the Evacuation of Children—undertakes to secure British passports, American visas, and shipping accommodation, and to provide escorts for the journey. Every care is taken to place each child in a suitable home and to give him the kind of education in the U.S.A. desired by the parents. The cost of the journey for each child is approximately £25. Any doctor wishing to take advantage of this generous offer for his own children should communicate with the Secretary, B.M.A. House, Tavistock Square, London, W.C.1.